

## MacDonald, Jennifer

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**From:** MacDonald, Jennifer  
**Sent:** January-02-18 9:29 AM  
**To:** Makkay, Kristina  
**Subject:** RE: Notification letter

Thanks for this info. When we were talking with Nfld region about how to proceed on this, they mentioned that they issue a SARA compliant s.52 licence; however, apparently we haven't been able to do that in Maritimes – it seems to have something to do with not being able to enter specific conditions in the Licencing software used in this region, although I'm going to look into it a little further.

Cheers,  
Jenn

**Jennifer MacDonald**  
Species at Risk Management Division  
(902) 407-8175

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**From:** Makkay, Kristina  
**Sent:** December-21-17 12:57 PM  
**To:** MacDonald, Jennifer  
**Subject:** RE: Notification letter

The s. 52 licence can also act as a SARA permit. [REDACTED] you could forward the SARA permit application to licencing with the intent of doing a s 52 licence that acts as a SARA permit (this can also feed into integration discussions), and inform the applicant that you have done so. ("Your application for a SARA permit contains enough information to serve as an application for a Licence to Fish for Scientific, Experimental, Educational, Public Display or Aquatic Invasive Species Control Purposes...with your permission, we will forward your application to licencing for this purpose")

With FPP integration, any SARA permit applications related to works & undertakings gets sent to FPP, where it serves as a proxy for a Request for Review under the Fisheries Act.

**Kristina Makkay**  
Species at Risk | Espèces en péril  
Fisheries and Oceans Canada | Pêches et Océans Canada  
200 Kent Street, Ottawa, ON K1A 0E6, 10W052  
Telephone | Téléphone 613-371-4998 \*new\*

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**From:** MacDonald, Jennifer  
**Sent:** December-21-17 7:40 AM  
**To:** Makkay, Kristina  
**Subject:** RE: Notification letter

Thanks Kristina.

I've drafted the following, although Darrin is going to provide some comments on this too....

*You may require additional approvals and permits for the proposed activities, including, but not limited to, the following:*

- *Licence to Fish for Scientific, Experimental, Educational, Public Display or Aquatic Invasive Species Control Purposes: If the proposed activities include fishing for educational purposes, public display, scientific purposes or to control aquatic invasive species, applicants may require a licence pursuant to Section 52 of the Fishery (General) Regulations.*
  - *For more information in Maritimes Region, please contact [RegionalLicensing.XMAR@dfo-mpo.gc.ca](mailto:RegionalLicensing.XMAR@dfo-mpo.gc.ca) and in Newfoundland and Labrador Region, please contact .*
- *Foreign Fishing Vessel Licence*
- *Permission from Parks Canada Agency regarding activities in proximity to Sable Island ([https://www.pc.gc.ca/apps/rps/page1\\_e.asp](https://www.pc.gc.ca/apps/rps/page1_e.asp)).*

*Please note that it remains your responsibility to meet any requirements of other federal, provincial and municipal legislation.*

Let me know if you see any concerns with this language. I can send you the final version when it's done if you think it would be helpful to send around to other regions.

Cheers,  
Jenn

**Jennifer MacDonald**  
Species at Risk Management Division  
(902) 426-0518

---

**From:** Makkay, Kristina  
**Sent:** December-20-17 5:25 PM  
**To:** MacDonald, Jennifer  
**Subject:** RE: Notification letter

All we have, in the "no permit required" letter, is the following paragraph:  
"It remains your responsibility to meet any requirements of other federal, provincial and municipal legislation, including, but not limited to, requirements under the Species at Risk Act if the activity affects any non-aquatic listed species at risk, or an Authorization under s.35(2)(b) of the Fisheries Act if the activity causes serious harm to species of fish that are part of a commercial, recreational or Aboriginal fishery, or to fish that support such a fishery."

I can circulate any wording you come up with to the other Regions for their use, if you would like.

**Kristina Makkay**  
Species at Risk | Espèces en péril  
Fisheries and Oceans Canada | Pêches et Océans Canada  
200 Kent Street, Ottawa, ON K1A 0E6, 10W052  
Telephone | Téléphone 613-371-4998 \*new\*

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**From:** MacDonald, Jennifer  
**Sent:** December-20-17 9:54 AM  
**To:** Makkay, Kristina  
**Subject:** Notification letter

Hi Kristina,  
I'm just drafting the notification letter to Ocearch re: their permit application (will be a joint letter from Nfld and Mar regions) – we've talked about including a note in the covering email that they will likely also need a s.52 experimental licence, a foreign vessel fishing licence and possibly permission from PCA if they are close to Sable Island. Do we have



any standard text that we can use that indicates that this may not be the complete list of all permitting requirements and that it is their responsibility to ensure they have all necessary approvals?

Thanks!

Jenn

**Jennifer MacDonald**

Species at Risk Biologist | Biologiste des espèces en péril

Species at Risk Management Division | Division de la gestion des espèces en péril

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**MacDonald, Jennifer**

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**From:** Farr, Connie  
**Sent:** January-03-18 1:13 PM  
**To:** MacDonald, Jennifer  
**Cc:** Docherty, Verna  
**Subject:** RE: SARA Permits and s.52 Licence

**PATH SAPH NO:** 17-PMAR-00018

Yes, if they are capturing the sharks to apply tags or take samples, they will need a s.52.

Connie

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**From:** MacDonald, Jennifer  
**Sent:** January-03-18 12:37 PM  
**To:** Farr, Connie  
**Cc:** Docherty, Verna  
**Subject:** RE: SARA Permits and s.52 Licence

Hi Connie,

Thanks so much for your message [REDACTED]

I will set up a quick time for us all to get together – I don't think it will take very long, but it would be great to quickly meet in person. The tagging program that is being proposed would involve catching white sharks in order to apply the tags, which is why I thought they may require a s.52 licence.

Thanks so much!

Jenn

**Jennifer MacDonald**  
Species at Risk Management Division  
(902) 407-8175

---

**From:** Farr, Connie  
**Sent:** December-22-17 9:07 AM  
**To:** MacDonald, Jennifer  
**Cc:** Docherty, Verna  
**Subject:** RE: SARA Permits and s.52 Licence

Sorry I haven't responded before now Jennifer, but the month of December is one of the most hectic and high pressure weeks in Licensing, other than the lobster season start ups in the Fall, December is one of the busiest times of the year when we are uploading fees and processing batch renewals and conditions for the new year.

If you would like to set up a meeting for the new year, I would be happy to attend. Normally any time a participant is collecting fish, they require a s52 licence. I'm not sure about tagging white sharks though, I have not seen a request like that before and Osearch is not a participant in our database so it would be something new. Perhaps you should also invite Verna Docherty who is our Manager and who also has experience as a resource manager.

Have a Merry Christmas and a Happy New Year!

Connie

Regional Manager Licensing Operations  
Maritimes Region  
Fisheries and Oceans Canada  
P.O. Box 1006, P600  
Dartmouth, NS  
B2Y 4A2  
e-mail: [licence.maritimes.permanis@dfo-mpo.gc.ca](mailto:licence.maritimes.permanis@dfo-mpo.gc.ca)  
fax: 902-426-5010  
Ph: 902-426-9966

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**From:** MacDonald, Jennifer  
**Sent:** December-13-17 2:32 PM  
**To:** Farr, Connie  
**Subject:** SARA Permits and s.52 Licence

Hello Connie,

I have recently taken over from Melanie Fleming in the SARA office [REDACTED] I wanted to touch base with you, so that you have my contact info as your current contact within the SARA office with respect to permitting.

Also, I have recently received a SARA permit application that relates to tagging White Sharks in both Maritimes and Newfoundland Regions (the applicant is Ocearch). As I'm new to the permitting file, I wanted to confirm that this type of activity would also likely require a s.52 licence? If that's the case, have you received an application from Ocearch? If an application has not been received, we can direct the organization to also apply for a licence.

As I'm working with Newfoundland region on the SARA permit review, and they have a different process than Maritimes region (when possible, they issue a SARA compliant s.52 licence and not a separate SARA permit), I thought it would also be important in this case to be in touch with you and try to coordinate all our processes. If you have some time available in the next few weeks, it would also be wonderful if I could meet with you briefly to better understand the licensing process in the region.

Thank you so much!  
Jenn

**Jennifer MacDonald**

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Species at Risk Management Division | Division de la gestion des espèces en péril  
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## MacDonald, Jennifer

---

**From:** Sooley, Darrin  
**Sent:** January-03-18 1:25 PM  
**To:** MacDonald, Jennifer  
**Subject:** RE: Oearch permit application - regional coordination

Jennifer I had a chat with Katrina I will give you a shout tomorrow morning.

Darrin

---

**From:** MacDonald, Jennifer  
**Sent:** January-02-18 9:47 AM  
**To:** Sooley, Darrin  
**Subject:** RE: Oearch permit application - regional coordination

Hi Darrin,  
Happy new year! Thanks for touching base – no problem, just let me know when have Katrina's input.  
Cheers,  
Jenn

**Jennifer MacDonald**  
Species at Risk Management Division  
(902) 407-8175

---

**From:** Sooley, Darrin  
**Sent:** January-02-18 9:12 AM  
**To:** MacDonald, Jennifer  
**Subject:** RE: Oearch permit application - regional coordination

Hi Jennifer:

I was hoping to discuss the draft response with Katrina but we could not connect last week. [REDACTED] Will likely be tomorrow or Thursday before I have a chance to do so.

Darrin

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**From:** Sooley, Darrin  
**Sent:** December-20-17 11:42 AM  
**To:** MacDonald, Jennifer  
**Subject:** RE: Oearch permit application - regional coordination

Thanks I will have a look and let you know if any changes etc...

---

**From:** MacDonald, Jennifer  
**Sent:** December-20-17 11:38 AM  
**To:** Sooley, Darrin  
**Subject:** RE: Oearch permit application - regional coordination

Hi Darrin,

Here is a draft of the notification letter and a covering email. I included the information about the other licences in the covering email rather than in the letter so that the letter followed as closely as possible the template, but let me know what you think. I also contacted Kristina Makkay to check in about whether there is any standard wording that we could/should use regarding the other required permits not being an exhaustive list and it remaining the responsibility of the applicant to identify all necessary approvals. I'm not sure I've got the wording right here – it could use some work, so feel free to change!

I've also attached the document we developed in conjunction with Science on other information we should request from the applicant; I've sent this to Science to confirm that it captures everything we discussed in our meeting yesterday, so it may change a little, but hopefully this is helpful at your end. If you want to add to it based on your review and any feedback from Science at your end, then we'll have one complete document to send to OCEARCH.

Cheers,  
Jenn

**Jennifer MacDonald**  
Species at Risk Management Division  
(902) 426-0518

---

**From:** Sooley, Darrin  
**Sent:** December-20-17 8:40 AM  
**To:** MacDonald, Jennifer  
**Subject:** RE: Ocearch permit application - regional coordination

Jennifer:

I have added a note to PATH about the coordinated review and will now add your PATH File to the related records tab as well.

Feel free to take a first cut at the notification letter and send along to us for review.

Darrin

---

**From:** MacDonald, Jennifer  
**Sent:** December-20-17 9:03 AM  
**To:** Sooley, Darrin  
**Cc:** Forsey, Sue; Sullivan, Katrina  
**Subject:** RE: Ocearch permit application - regional coordination

Hi Darrin,  
Thanks for the update – that all sounds great. I will clean up my notes this morning and send them along to you.

We will also need to add a note to the letter about applying for an experimental licence in Maritimes too, as well as reminder for a Foreign Fishing licence and it was also mentioned to me, that depending on how close to Sable Island they are planning to go, they may also need permission from Parks Canada. I will see if I can find out any more about this. Do you want me to take a first go at drafting the letter?

I have also opened a PATH file (17-PMAR-00018), so I will add your file number under related records and a note about the joint review.

Cheers,  
Jenn

**Jennifer MacDonald**  
Species at Risk Management Division  
(902) 426-0518

---

**From:** Sooley, Darrin  
**Sent:** December-20-17 7:45 AM  
**To:** MacDonald, Jennifer  
**Cc:** Forsey, Sue; Sullivan, Katrina  
**Subject:** RE: Oearch permit application - regional coordination

Jennifer:

Katrina is fine with a coordinated one notification letter approach we will need to add the bit about requirement for OSEARCH to submit Application for Experimental License to our Regional Licensing folks. I have not had an opportunity to speak with our Shark lead in Science yet hoping to do so before Christmas Break if not it will have to wait until early new year, any notes you can provide relative to discussions on your end would be welcomed.

What about PATH I have started a file in PATH have you? If you have perhaps we could exchange PATH File#'s (ours is #17-pnfl-00020) so we can make note FYI on each that both NL and Maritimes Regions will be involved in this permit review.

Cheers,

*Darrin R. Sooley*

A/Senior Biologist  
Species at Risk | Espèces en Péril  
Ecosystems Management | Gestion des écosystèmes  
Fisheries and Oceans Canada | Pêches et Océans Canada  
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Centre des Pêches de l'Atlantique Nord-Ouest  
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Fax | Télécopieur: (709) 772-5562  
Email: [darrin.sooley@dfo-mpo.gc.ca](mailto:darrin.sooley@dfo-mpo.gc.ca)

---

**From:** MacDonald, Jennifer  
**Sent:** December-19-17 4:38 PM  
**To:** Sooley, Darrin  
**Cc:** Forsey, Sue; Brennin Houston, Ree  
**Subject:** RE: Oearch permit application - regional coordination

Hi Darrin,  
I just wanted to let you know that Ree and I just met with our leads for White Shark in Science (Heather Bowlby and Warren Joyce) and have had some really useful feedback on the Oearch application. We have begun drafting a list of

additional information we would like to request from Ocearch, which I can share with you when I've finished adding the notes from today's meeting. Then if you have additional questions, you could add to that list – hopefully that saves us recreating the same work.

Also, have you had any feedback from Katrina on the approach we will take?

Thanks!

Jenn

**Jennifer MacDonald**

Species at Risk Management Division  
(902) 426-0518

---

**From:** Sooley, Darrin  
**Sent:** December-14-17 10:58 AM  
**To:** MacDonald, Jennifer  
**Cc:** Forsey, Sue; Brennin Houston, Ree  
**Subject:** RE: Ocearch permit application - regional coordination

Jennifer

Thanks for the draft interregional protocol and Maritimes Assessment and Review Form.

With respect to a coordinated notification of receipt letter as discussed I will speak with Katrina – she is out of the office today - and let you know what her thoughts are.

Darrin

---

**From:** MacDonald, Jennifer  
**Sent:** December-14-17 11:24 AM  
**To:** Sooley, Darrin  
**Cc:** Forsey, Sue; Brennin Houston, Ree  
**Subject:** Ocearch permit application - regional coordination

Hi Darrin,

Thanks for a good chat this morning. I have attached the draft Inter-regional Permitting Coordination document that I received from Alain Kemp in Quebec Region, as well as the Assessment and Review form that we use here in Maritimes.

I spoke with Donald following our call and he agrees with a coordinated approach on communicating with Ocearch, including sending one Notification of Receipt letter. He has suggested that Maritimes region, as the lead for the species, take on this coordinating role, if that is ok with your region. If Katrina agrees with sending on letter, then we can work on the appropriate text for that.

Thanks again,  
Jenn

**Jennifer MacDonald**

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## **MacDonald, Jennifer**

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**From:** Sooley, Darrin  
**Sent:** January-08-18 12:49 PM  
**To:** MacDonald, Jennifer  
**Subject:** RE: Oearch permit application - regional coordination  
**Attachments:** APPLICATION FOR EXPERIMENTAL LICENCE.doc

**Follow Up Flag:** Follow up  
**Flag Status:** Completed

Jennifer:

One very small comment on the covering email 3<sup>rd</sup> line of 1<sup>st</sup> bullet suggest changing “..may require..” to “..will require...”

Also as discussed please find attached copy of a blank “Application for Experimental, Scientific, Educational or Public Display License” that our Regional Licensing group uses/sends to applicants.

Please cc both myself and Katrina when letter is sent to OCEARCH.

Darrin

---

**From:** MacDonald, Jennifer  
**Sent:** January-08-18 9:29 AM  
**To:** Sooley, Darrin  
**Subject:** RE: Oearch permit application - regional coordination

Hi Darrin,  
Here is the revised covering email and notification letter for another review – let me know if you have any further comments and then I will send this off today.  
Thanks!  
Jenn

**Jennifer MacDonald**  
Species at Risk Management Division  
(902) 407-8175

---

**From:** Sooley, Darrin  
**Sent:** January-05-18 1:03 PM  
**To:** MacDonald, Jennifer  
**Subject:** RE: Oearch permit application - regional coordination

Hi Jennifer:

Further to email from yesterday [REDACTED] - have reviewed the December 20 draft email, notification letter and Additional Information Listing and have a number of minor comments as follows:

- Covering E-mail:



- First bullet - The contact information for NL Region Licensing would be experimental.licenses@dfo-mpo.gc.ca
- With respect to wording about other permits/approvals (see second last paragraph in your cover email). I offer the following sentence that was used in Letters of Advice issued in the former Habitat program and which is also included in the current Letter B template letter for the FPP ***"It remains your (OCEARCH's) responsibility to meet other requirements of federal, provincial and municipal authorities and agencies."*** We may not need to include municipal authorities but it is just as easy to leave it and let them figure it out.
- If you recall the covering letter from OCEARCH they were wondering about possible collaborators for the Atlantic surveys not sure about on your end but our Regional Shark/SARA Science contact (Dr. Mark Simpson) indicated in my discussion with him that he would be very interested in having one of his Technicians onboard during the NL Region portion of the survey. If possible perhaps we could include that within the covering email as it does not appear to be a fit for the Notification Letter.
- Notification Letter:
  - NL Region File No. would be our PATH File No. 17-pnfl-00020
  - How do we ask for the noted Additional information using the notification letter. I am not sure if it has provision for doing so and it establishes a 90 day timeline for completion which assumes we have all information needed to complete the review. Myself and Katrina wondered whether it would be better to send the ***"Additional Information Required"*** template letter rather than the notification letter that way we are still acknowledging receipt of their applications, we can note the joint review / coordinated review being led by Maritimes Region, however the 90 day timeline would not kick in until the requested information has been provided / received.
  - Given requirement for Experimental Licenses from both our Regions should we clarify the last paragraph of the letter noting that you will be "...the central contact for Maritimes and NL Region SAR Programs"?
- Additional Information Listing:
  - Based on discussion / review with Mark Simpson on info in the SARA Application and the listed Additional Information - we have nothing further to add to the list.

We can discuss next week.

Regards,

Darrin

---

**From:** MacDonald, Jennifer  
**Sent:** December-20-17 11:38 AM  
**To:** Sooley, Darrin  
**Subject:** RE: Ocearch permit application - regional coordination

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**Jennifer MacDonald**  
Species at Risk Management Division  
(902) 426-0518

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*Darrin R. Sooley*

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Centre des Pêches de l'Atlantique Nord-Ouest  
80 East White Hills Road | 80, route White Hills est  
PO Box 5667 | CP 5667  
St. John's NL A1C 5X1 Canada

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Fax | Télécopieur: (709) 772-5562  
Email: [darrin.sooley@dfo-mpo.gc.ca](mailto:darrin.sooley@dfo-mpo.gc.ca)

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**Sent:** December-19-17 4:38 PM  
**To:** Sooley, Darrin  
**Cc:** Forsey, Sue; Brennin Houston, Ree  
**Subject:** RE: Ocearch permit application - regional coordination

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Also, have you had any feedback from Katrina on the approach we will take?

Thanks!

Jenn

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**To:** MacDonald, Jennifer  
**Cc:** Forsey, Sue; Brennin Houston, Ree  
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Jennifer

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**Cc:** Forsey, Sue; Brennin Houston, Ree  
**Subject:** Oearch permit application - regional coordination

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I spoke with Donald following our call and he agrees with a coordinated approach on communicating with Oearch, including sending one Notification of Receipt letter. He has suggested that Maritimes region, as the lead for the species, take on this coordinating role, if that is ok with your region. If Katrina agrees with sending on letter, then we can work on the appropriate text for that.

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Email | Courriel: [jennifer.macdonald@dfo-mpo.gc.ca](mailto:jennifer.macdonald@dfo-mpo.gc.ca)

**Page 15**  
**is a duplicate of**  
**est un duplicata de la**  
**page 22**

## MacDonald, Jennifer

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**From:** MacDonald, Jennifer  
**Sent:** January-08-18 2:25 PM  
**To:** 'Chris Fischer'  
**Cc:** Sooley, Darrin; Sullivan, Katrina; Humphrey, Donald  
**Subject:** Receipt of SARA Permit Application  
**Attachments:** SARA-Application-Received-signed.pdf; Revised Section 52 Licence Request Form (October 2017).docx; APPLICATION FOR EXPERIMENTAL LICENCE.doc

Hello Mr. Fischer,

I have attached the official letter acknowledging receipt of your applications to Fisheries and Oceans Canada (Maritimes and Newfoundland and Labrador Regions) for a *Species at Risk Act* Permit. Your applications will be reviewed and a response informing you of the decision to issue or decline to issue a permit will be provided to you following this review.

Please note, it remains your (OCEARCH's) responsibility to meet other requirements of federal, provincial and municipal authorities and agencies, including, but not limited to, the following:

- Licence to Fish for Scientific, Experimental, Educational, Public Display or Aquatic Invasive Species Control Purposes: If the proposed activities include fishing for educational purposes, public display, scientific purposes or to control aquatic invasive species, applicants will require a licence pursuant to Section 52 of the *Fishery (General) Regulations*. The application forms for the respective DFO regions are attached. For more information in Maritimes Region, please contact [RegionalLicensing.XMAR@dfo-mpo.gc.ca](mailto:RegionalLicensing.XMAR@dfo-mpo.gc.ca) and in Newfoundland and Labrador Region, please contact [experimental.licenses@dfo-mpo.gc.ca](mailto:experimental.licenses@dfo-mpo.gc.ca);
- Foreign Fishing Vessel Licence;
- Permission from Parks Canada Agency regarding activities in proximity to Sable Island ([https://www.pc.gc.ca/apps/rps/page1\\_e.asp](https://www.pc.gc.ca/apps/rps/page1_e.asp)).

Should you have any questions, please contact me at the information below.

Regards,  
Jennifer

### Jennifer MacDonald

Species at Risk Biologist | Biologiste des espèces en péril  
Species at Risk Management Division | Division de la gestion des espèces en péril  
Ecosystem Management | Gestion des écosystèmes  
Fisheries & Oceans Canada | Pêches & Océans Canada  
P.O. Box 1006 Dartmouth N.S. | C.P. 1006 Dartmouth N.E. B2Y 4A2  
Tel | Tél: (902) 407-8175 Fax | Téléc: (902) 426-2331  
Email | Courriel: [jennifer.macdonald@dfo-mpo.gc.ca](mailto:jennifer.macdonald@dfo-mpo.gc.ca)



Fisheries and Oceans    Pêches et Océans  
Canada                      Canada

PO Box 1006  
Dartmouth, NS  
B2Y 4A2

January 8, 2018

*Your file                      Votre référence*

*Our file                      Notre référence*  
DFO-MAR-2017-17 (MAR)  
17-PNFL-00020 (NFLD)

Chris Fischer  
OCEARCH  
1790 Bonanza Drive, Suite 101B  
Park City, Utah 84060

Dear Mr. Fischer:

**Subject:    Receipt of application for a permit under the *Species at Risk Act* (SARA).**

On behalf of the Species at Risk Program (the Program) of Fisheries and Oceans Canada in both Maritimes and Newfoundland and Labrador Regions, I would like to acknowledge receipt of your applications for a permit under the *Species at Risk Act* which were received on December 6, 2017.

Your applications will be reviewed and a response informing you of the decision to issue or decline to issue a permit will be provided within 90 days of the date of this letter, in accordance with the *Permits Authorizing an Activity Affecting Listed Wildlife Species Regulations*, unless one of the following conditions apply:

- additional consultations are necessary, including Aboriginal consultations;
- a decision first needs to be made under another federal law (e.g. the *Canadian Environmental Assessment Act*) before a permit can be legally issued;
- the terms and conditions of a SARA permit that was previously issued to you have not been met;
- you request or agree that the time limit not apply; or
- the activity described in the permit application is modified before DFO provides a response to you.

You will be notified within 90 days if one of these conditions applies to your application. If any changes are made to your application during this time, please contact me with the updated information.

As the proposed activities will take place in two DFO administrative regions, permits will be required from both Maritimes and Newfoundland and Labrador Regions; however, the

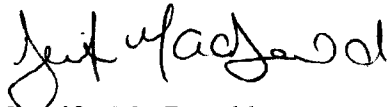
Canada

.../2

two regions will conduct a coordinated review of your applications. Any additional information provided to me will be used in the review of your application by both DFO regions.

I will be your central contact on behalf of the Species at Risk Programs in both Maritimes and Newfoundland and Labrador Regions. If you have any questions, please contact me at our Dartmouth, Nova Scotia office at 902-407-8175 or by email at [jennifer.macdonald@dfo-mpo.gc.ca](mailto:jennifer.macdonald@dfo-mpo.gc.ca).

Yours sincerely,



Jennifer MacDonald  
Species at Risk Biologist  
Fisheries and Oceans Canada, Maritimes Region

c.c.

Darrin Sooley, Species at Risk Biologist, Fisheries and Oceans Canada, Newfoundland and Labrador Region





**PURPOSE**  
(PLEASE SELECT ONE)

☐ SCIENTIFIC

☐ EDUCATIONAL

☐ AIS CONTROL

☐ PUBLIC DISPLAY \*

\*( \$100 fee applies)

The information you provide on this form is collected under the authority of the *Fishery (General) Regulations* for the purpose of determining eligibility for a licence, and to create the licence and related conditions for a licence to fish for Scientific, Experimental, Educational, Public Display or Aquatic Invasive Species control purposes. The information may be used for planning or management, reporting, safety or security purposes, audit, evaluation, statistical, research, policy development, administration or enforcement of a law, the detection, prevention, or suppression of crime, and/or investigative purposes and disclosed to Parks Canada (PC) when a licence is issued in a park under PC's jurisdiction. Failure to provide this personal information may result in your licence being denied. You have the right to the correction of, access to, and protection of, your personal information under the *Privacy Act* and to file a complaint with the Privacy Commissioner of Canada over DFO's handling of your information. Personal information collected through the processing of your application is described in the Personal Information Bank, DFO PPU 085 and can be accessed and assessed for accuracy.

Current Licence No.

- \_\_\_\_\_

- End Date:
- 

- |                                 |  |
|---------------------------------|--|
| <b>Legal Name of Applicant:</b> |  |
| <b>Organization:</b>            |  |
| <b>Street Address/Unit No.:</b> |  |
| <b>City/Province:</b>           |  |
| <b>Postal Code:</b>             |  |
| <b>Telephone No.:</b>           |  |
| <b>Cellular No.:</b>            |  |
| <b>Email Address:</b>           |  |

4. List of individuals that will be assisting with the activity. If necessary, please add additional page(s).

Legal Name of Individual	Date of Birth (YY/MM/DD)	Telephone No.

5. Species: If necessary, please add additional page(s).

Species	Life Stage	Size	Number to be caught and sampled		
			to be caught	to be released	to be retained

6. Details of where the activity is to occur, and the gear being used. Please provide detailed information (including coordinates, if possible)

Location of Activity (attach map if available)	County (if applicable)	Gear Type (Note: fixed gear must be identified with the name of the licence holder and the licence number)

7. Vessel Identification:  
If no vessel is used, please leave fields empty.

Vessel Name	Vessel Owner	Vessel Registration Number (if applicable)

8. Fish Transfers:

Using as much detail as possible, please provide information on any fish introductions and/or transfers that will take place under this licence (e.g. species to be introduced, number of, life stages, etc.).

--

9. Additional Details:

Using as much detail as possible, please include research activities, methods of collection, details on the disposition of the specimens (including release methods and location), and precautions that will be taken to avoid unintended fish mortality. Please provide information on handling of non-target species.

--

## **Important Notes**

### **I. Species At Risk:**

If the proposed activity has the potential to affect a Species at Risk listed as endangered or threatened, or their residence or critical habitat, applicants may need a *Species at Risk Act* (SARA) Permit (refer to SARA sections 32, 33, and subsection 58(1)).

Additional information, including a SARA Permit Application form, can be found online at: <http://www.dfo-mpo.gc.ca/species-especes/sara-lep/permits-permis/index-eng.html>.

For further information, please contact the Species at Risk Management Division, Maritimes Region by phone at 1-866-891-0771 or by email at [SpeciesatRisk.xmar@dfo-mpo.gc.ca](mailto:SpeciesatRisk.xmar@dfo-mpo.gc.ca).

### **II. Marine Protected Areas:**

There are several *Oceans Act* Marine Protected Areas (MPAs) in DFO Maritimes Region. These areas have been established to protect particular species, habitats, and/or ecological features.

A list of MPAs can be found online at: <http://www.dfo-mpo.gc.ca/oceans/mpa-zpm/index-eng.html>.

If the proposed activity will be carried out within any of these MPAs, please contact [MaritimesMPAs@dfo-mpo.gc.ca](mailto:MaritimesMPAs@dfo-mpo.gc.ca) for more information, as additional approvals are required.

### **III. Sensitive Benthic Areas:**

Multiple locations in DFO Maritimes Region have been closed to bottom-contact fishing activities in order to protect sensitive benthic habitat and species. A list of these conservation closures can be found online at: <http://www.dfo-mpo.gc.ca/oceans/ceccsr-cerceef/measures-mesures-eng.html>.

If the proposed research involves bottom-contact activities within any of these conservation areas, please email: [dfo.mar-fm-gp.mpo@dfo-mpo.gc.ca](mailto:dfo.mar-fm-gp.mpo@dfo-mpo.gc.ca) for more information.

### **IV. Educational Purposes:**

Activities associated with capturing aquatic organisms for the sole purpose of demonstrating sampling techniques, aquatic diversity, biological principles and public relations. This may include retaining organisms for further analysis.

### **V. Public Display:**

Activities associated with capturing organisms for the purpose of retaining the animals (dead or alive) and displaying these in public venues. Examples would be school aquaria, "touch tanks", "living streams", etc. The organisms are specifically destined to be removed from the wild and held in captivity and are not to be returned to the wild after capture. Generally, these organisms would be destroyed after the public display purposes are fulfilled. (Fee \$100.00)

### **VI. Scientific Purposes:**

Activities associated with capturing aquatic organisms for the purpose of measuring species abundance, distribution, and biological characteristics for the purpose of assessing stock status, for environmental impact assessment, for environmental monitoring programs or for experiments in field or laboratory. These activities are not intended to evaluate feasibility of fisheries but would include activities associated with gear selectivity experiments.

### **VII. Aquatic Invasive Species Control Purposes:**

Activities associated with controlling aquatic invasive species, as identified under the *Aquatic Invasive Species Regulations*. For more information, please visit: <http://www.dfo-mpo.gc.ca/science/environmental-environnement/ais-eae/regulations-eng.html>

### **VIII. Introduction of live Fish:**

If the proposed activity has the potential to introduce live fish into fish habitat or transfer live fish to or between fish rearing facilities, applicants may require a licence pursuant to Section 56 of the *Fishery (General) Regulations*.

Additional information concerning the application process and provincial contacts can be found online at: <http://www.dfo-mpo.gc.ca/aquaculture/management-gestion/intro-eng.htm>

## APPLICATION FOR EXPERIMENTAL, SCIENTIFIC, EDUCATIONAL, OR PUBLIC DISPLAY LICENCE

Please allow a minimum of 14 working days for application to be processed and licence to be issued.

Please Print

Section 1 To be completed by Applicant			
1.1	Name of Company/ Individual/Organization:		1.2 FIN:
1.3	Address:		1.4 Postal Code:
1.5	Contact Person:		1.6 Telephone #:
1.7	Fax Number:		1.8 Email:
1.9	<div style="display: flex; justify-content: space-between;"> <div style="width: 40%;"> <b>Purpose for requesting the licence:</b> <i>(include the overall purpose of the request, and the specific objectives. Objectives must be linked to one or more of the required categories.)</i> </div> <div style="width: 55%;"> <b>Please check one or more Category of Request:</b>  <input type="checkbox"/> Experimental      <input type="checkbox"/> Scientific  <input type="checkbox"/> Educational      <input type="checkbox"/> Public Display </div> </div>		
1.10	Is this experiment / works a requirement under the Fisheries Act Section 35(2) and a Fisheries Act Authorization?	Yes _____ No _____	
1.11	<b>Location of Activity</b> Please supply map: <small>Please Note: If applicant is to operate within National Parks limit (Gros Morne National Park, Terra Nova National Park or Torngat Mountains National Park Reserve) or the Nunatsiavut Land Claim area, you must contact the appropriate Agency to determine if an access permit or licence is required. All applicants must ensure that they have all applicable licences and / or permits before commencing fishing activities.</small>		
1.12	Date of Activity:		
1.13	Identify the species affected and number to be killed, or caught and released:		
1.14	If biological sampling is required, list the type of sampling to be conducted:		
1.15	Type of gear to be used, amount & Method of Collection:		
	<b>NOTE:</b>	Electrofishing ripening/mature fish or electrofishing over redds can kill eggs. Use of an electrofisher, after September 15, can do extreme damage to future populations when used late on the year, i.e. spawning. Requests for electro fishing after September 15 may not be approved.	
1.16	Name(s) of Designates:		
1.17	If applicable, Vessel Name & Vessel Registration Number(VRN):		
1.18	Were you issued a similar licence in the past 3 years? If yes, what was the Licence #:		
1.19	Is this request an amendment to a licence already issued for the current year?	1.20	If yes, what is the Licence Number?
1.21	Other Details/Comments: <i>(attach separate sheet if necessary)</i>		
1.22	Will your proposed activities be in salt water _____ or freshwater? _____ IF you have indicated saltwater, please complete attached "Application for a Species at Risk Permit".		
1.23	Will you be using gillnets, longlines, otter trawls or traps? Yes _____ No _____		
1.24	Applicant's Signature: <small>(Please type name / date if emailing)</small>		1.25 Date:

Return to:

Experimental Licences, Regional Licencing Unit  
Fisheries & Oceans Canada  
PO Box 5667

St. John's NL A1C 5X1 or EMAIL: [experimental.licenses@dfo-mpo.gc.ca](mailto:experimental.licenses@dfo-mpo.gc.ca)

## MacDonald, Jennifer

---

**From:** Robert Hueter <rhuetter@mote.org>  
**Sent:** January-09-18 5:07 PM  
**To:** Chris Fischer; MacDonald, Jennifer  
**Cc:** Sooley, Darrin; Sullivan, Katrina; Humphrey, Donald; Bryan Franks; Fernanda Ubatuba; Ami Meite; Brandon  
**Subject:** Re: Receipt of SARA Permit Application

Chris can you please forward to the rest of us the application forms that Jennifer attached to her email... Bob

### **ROBERT E. HUETER, Ph.D.**

*Senior Scientist & Director, Center for Shark Research  
Perry W. Gilbert Chair in Shark Research  
Manager, Sharks & Rays Conservation Research Program  
Mote Marine Laboratory  
1600 Ken Thompson Parkway  
Sarasota, FL 34236 USA*

[rhuetter@mote.org](mailto:rhuetter@mote.org)

Tel: 941-388-1827

Fax: 941-388-4312

More info at: [www.mote.org](http://www.mote.org)

On 1/9/2018 4:04 PM, Chris Fischer wrote:

Jennifer,

Thank you for your reply.

Do you have any idea on the typical timeline for the review process?

We will reach out to the other authorities and agencies mentioned in your email below. Thank you for this information.

I am copying in several of our team members who are working on this process at ocearch.

If possible, please include them on all future correspondence so we can reply to any questions etc in a timely manner.

We are grateful for your consideration and hope you have a great 2018.

All the best,

Chris

**CHRIS FISCHER** | Expedition Leader | Founding Chairman

**P: 435.645.8990 | F: 435.645.7077 | BE**

**ENGAGED: OCEARCH.ORG**

**OCEARCH** |

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On Jan 8, 2018, at 11:25 AM, MacDonald, Jennifer <[Jennifer.MacDonald@dfompo.gc.ca](mailto:Jennifer.MacDonald@dfompo.gc.ca)> wrote:

Hello Mr. Fischer,

I have attached the official letter acknowledging receipt of your applications to Fisheries and Oceans Canada (Maritimes and Newfoundland and Labrador Regions) for a *Species at Risk Act* Permit. Your applications will be reviewed and a response informing you of the decision to issue or decline to issue a permit will be provided to you following this review.

Please note, it remains your (OCEARCH's) responsibility to meet other requirements of federal, provincial and municipal authorities and agencies, including, but not limited to, the following:

- Licence to Fish for Scientific, Experimental, Educational, Public Display or Aquatic Invasive Species Control Purposes: If the proposed activities include fishing for educational purposes, public display, scientific purposes or to control aquatic invasive species, applicants will require a licence pursuant to Section 52 of the *Fishery (General) Regulations*. The application forms for the respective DFO regions are attached. For more information in Maritimes Region, please contact [RegionalLicensing.XMAR@dfo-mpo.gc.ca](mailto:RegionalLicensing.XMAR@dfo-mpo.gc.ca) and in Newfoundland and Labrador Region, please contact [experimental.licenses@dfo-mpo.gc.ca](mailto:experimental.licenses@dfo-mpo.gc.ca);
- Foreign Fishing Vessel Licence;
- Permission from Parks Canada Agency regarding activities in proximity to Sable Island ([https://www.pc.gc.ca/apps/rps/page1\\_e.asp](https://www.pc.gc.ca/apps/rps/page1_e.asp)).

Should you have any questions, please contact me at the information below.

Regards,  
Jennifer

**Jennifer MacDonald**

Species at Risk Biologist | Biologiste des espèces en péril  
Species at Risk Management Division | Division de la gestion des espèces en péril  
Ecosystem Management | Gestion des écosystèmes  
Fisheries & Oceans Canada | Pêches & Océans Canada  
P.O. Box 1006 Dartmouth N.S. | C.P. 1006 Dartmouth N.E. B2Y 4A2  
Tel | Tél: (902) 407-8175 Fax | Téléc: (902) 426-2331  
Email | Courriel: [jennifer.macdonald@dfo-mpo.gc.ca](mailto:jennifer.macdonald@dfo-mpo.gc.ca)

<SARA-Application-Received-signed.pdf><Revised Section 52 Licence Request Form (October 2017).docx><APPLICATION FOR EXPERIMENTAL LICENCE.doc>

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pages 36 to / à 37**



Fisheries and Oceans  
Canada

Pêches et Océans  
Canada

PO Box 1006  
Dartmouth, NS  
B2Y 4A2

January 10, 2018

*Your file*      *Votre référence*

*Our file*      *Notre référence*  
DFO-MAR-2017-17 (MAR)  
17-PNFL-00020 (NFLD)

Chris Fischer  
OCEARCH  
1790 Bonanza Drive, Suite 101B  
Park City, Utah 84060

Dear Mr. Fischer:

**Subject: Request for additional information – Application for Species at Risk permit to conduct research on White Shark**

Further to the receipt of your application for a Permit under the *Species at Risk Act* on December 6, 2017, the Species at Risk Program (the Program) of Fisheries and Oceans Canada has determined that some of the information and documentation set out in the *Permits Authorizing an Activity Affecting Listed Wildlife Species Regulations* has not been provided and as such, the application is incomplete.

In order for us to continue processing your request, please provide the following:

- Additional information with respect to the qualifications of the Expedition crew;
- Additional information describing the proposed activity;
- How the anticipated effects of the proposed activity were determined;
- Information demonstrating that all reasonable alternatives to the proposed activity were considered to reduce the impact on the listed wildlife species, including a description of the alternatives considered but rejected;
- An explanation of how the best solution of all the alternatives was adopted;
- Information demonstrating that all feasible measures will be taken to minimize impacts of the activity on the listed wildlife species, including the measures considered but rejected as unfeasible.

Specific questions have been detailed in the document attached.

Your application will be suspended until all of the above information has been received, in accordance with the *Permits Authorizing an Activity Affecting Listed Wildlife Species*

.../2



*Regulations.* Once the requested information has been received, the 90 day timeline for issuing permits under section 73 of SARA will be reinstated.

If you have any questions, please contact me at our Dartmouth, Nova Scotia office at 902-407-8175, or by email at [jennifer.macdonald@dfo-mpo.gc.ca](mailto:jennifer.macdonald@dfo-mpo.gc.ca).

Yours sincerely,



Jennifer MacDonald  
Species at Risk Biologist  
Fisheries and Oceans Canada, Maritimes Region

Attachments (1):

- Application for a Species at Risk Permit (Fisheries and Oceans Canada) – Additional information requested in order to review the permit application from OCEARCH to tag and sample White Shark

c.c.

Darrin Sooley, Species at Risk Biologist, Fisheries and Oceans Canada, Newfoundland and Labrador Region

**Pages 29 to / à 30  
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page 0**

## MacDonald, Jennifer

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**From:** Chris Fischer <chris@oearch.org>  
**Sent:** January-10-18 1:41 PM  
**To:** MacDonald, Jennifer  
**Cc:** Sooley, Darrin; Bob Hueter; Bryan Franks; Fernanda Ubatuba!; Ami Meite; Brandon  
**Subject:** Re: Receipt of SARA Permit Application

**PATH SAPH NO:** 17-PMAR-00018

Thank you Jenn.

I will review the attached docs with the science team and get the information back to you.

We are preparing to depart on Expedition from Jan 15- Feb 5 off the SE US so it may be awhile until we can address all the questions.

Grateful for all your help.

Best,  
chris

CHRIS FISCHER | Expedition Leader | Founding Chairman

**P: 435.645.8990 | F: 435.645.7077 | BE  
ENGAGED: OSEARCH.ORG**

**OSEARCH** |

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On Jan 10, 2018, at 7:44 AM, MacDonald, Jennifer <[Jennifer.MacDonald@dfo-mpo.gc.ca](mailto:Jennifer.MacDonald@dfo-mpo.gc.ca)> wrote:

Hello Chris,

Thank you for your message. As indicated in our notification letter, under the regulations, you will receive a response to your permit application within 90 days from the date on the notification letter. There are instances where we are able to review and respond in less than 90 days, but I cannot guarantee that, especially at this time of year as we are currently receiving a number of permit applications for spring fieldwork.

We have conducted a preliminary review of your application and do have a number of questions or areas of the application for which we would like to request additional information. The attached document outlines a number of specific questions. As detailed in the attached letter, our 90 day review timeline will be suspended until we have received all the necessary information back from OSEARCH and we are able to resume our review.

Should you have any questions or would like clarification on any of the questions in the attached, please do not hesitate to get in touch.

Best regards,  
Jenn

Jennifer MacDonald  
Species at Risk Management Division  
(902) 407-8175

---

**From:** Chris Fischer [<mailto:chris@oceanarch.org>]  
**Sent:** January-09-18 5:04 PM  
**To:** MacDonald, Jennifer  
**Cc:** Sooley, Darrin; Sullivan, Katrina; Humphrey, Donald; Bob Hueter; Bryan Franks; Fernanda Ubatuba; Ami Meite; Brandon  
**Subject:** Re: Receipt of SARA Permit Application

Jennifer,  
Thank you for your reply.  
Do you have any idea on the typical timeline for the review process?  
We will reach out to the other authorities and agencies mentioned in your email below. Thank you for this information.  
I am copying in several of our team members who are working on this process at oceanarch.  
If possible, please include them on all future correspondence so we can reply to any questions etc in a timely manner.  
We are grateful for your consideration and hope you have a great 2018.  
All the best,  
Chris

CHRIS FISCHER | Expedition Leader | Founding Chairman  
**P: 435.645.8990 | F: 435.645.7077 | BE**  
**ENGAGED: OCEARCH.ORG**

<image001.jpg>

On Jan 8, 2018, at 11:25 AM, MacDonald, Jennifer <[Jennifer.MacDonald@dfo-mpo.gc.ca](mailto:Jennifer.MacDonald@dfo-mpo.gc.ca)> wrote:

Hello Mr. Fischer,

I have attached the official letter acknowledging receipt of your applications to Fisheries and Oceans Canada (Maritimes and Newfoundland and Labrador Regions) for a *Species at Risk Act* Permit. Your applications will be reviewed and a response informing you of the decision to issue or decline to issue a permit will be provided to you following this review.

Please note, it remains your (OCEARCH's) responsibility to meet other requirements of federal, provincial and municipal authorities and agencies, including, but not limited to, the following:

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DFO regions are attached. For more information in Maritimes Region, please contact [RegionalLicensing.XMAR@dfo-mpo.gc.ca](mailto:RegionalLicensing.XMAR@dfo-mpo.gc.ca) and in Newfoundland and Labrador Region, please contact [experimental.licenses@dfo-mpo.gc.ca](mailto:experimental.licenses@dfo-mpo.gc.ca);

- Foreign Fishing Vessel Licence;
- Permission from Parks Canada Agency regarding activities in proximity to Sable Island ([https://www.pc.gc.ca/apps/rps/page1\\_e.asp](https://www.pc.gc.ca/apps/rps/page1_e.asp)).

Should you have any questions, please contact me at the information below.

Regards,  
Jennifer

**Jennifer MacDonald**

Species at Risk Biologist | Biologiste des espèces en péril  
Species at Risk Management Division | Division de la gestion des espèces en péril  
Ecosystem Management | Gestion des écosystèmes  
Fisheries & Oceans Canada | Pêches & Océans Canada  
P.O. Box 1006 Dartmouth N.S. | C.P. 1006 Dartmouth N.E. B2Y 4A2  
Tel | Tél: (902) 407-8175 Fax | Téléc: (902) 426-2331  
Email | Courriel: [jennifer.macdonald@dfo-mpo.gc.ca](mailto:jennifer.macdonald@dfo-mpo.gc.ca)

<SARA-Application-Received-signed.pdf><Revised Section 52 Licence Request  
Form (October 2017).docx><APPLICATION FOR EXPERIMENTAL  
LICENCE.doc>

<SARA-Request-additional-information-cover letter and attachement\_Signed.pdf>

## **MacDonald, Jennifer**

---

**From:** MacDonald, Jennifer  
**Sent:** January-17-18 9:36 AM  
**To:** Macnab, Paul  
**Subject:** SARA Permit Application

Hi Paul,

Just wanted to let you know that we've received a SARA Permit application from OCEARCH to conduct White Shark tagging work next fall. I don't think any of the areas that they are proposing to work in require any approval from OCMD, but just wanted to double check. They are proposing to conduct tagging in:

- COASTAL NOVA SCOTIA, including the following areas:
  - MAHONE BAY 44° 29.50' N / 64° 13.50' W and adjacent areas
  - BAY OF FUNDY 44° 54.00' N / 66° 32.50' W and adjacent areas
- SOUTH COAST OF NEWFOUNDLAND, including:
  - PLACENTIA BAY 47° 05.00' N / 54° 32.00' W
- SABLE ISLAND 43° 56.14' N / 59° 56.59' W

They indicated in their application that they have applied for the Foreign Vessel approval as well.

Thanks,  
Jenn

### **Jennifer MacDonald**

Species at Risk Biologist | Biologiste des espèces en péril  
Species at Risk Management Division | Division de la gestion des espèces en péril  
Ecosystem Management | Gestion des écosystèmes  
Fisheries & Oceans Canada | Pêches & Océans Canada  
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Tel | Tél: (902) 407-8175 Fax | Téléc: (902) 426-2331  
Email | Courriel: [jennifer.macdonald@dfo-mpo.gc.ca](mailto:jennifer.macdonald@dfo-mpo.gc.ca)

## MacDonald, Jennifer

---

**From:** Robert Hueter <rhuetter@mote.org>  
**Sent:** January-23-18 10:00 AM  
**To:** MacDonald, Jennifer; Chris Fischer  
**Cc:** Sooley, Darrin; Bryan Franks; Fernanda Ubatuba; Ami Meite; Brandon  
**Subject:** Re: Receipt of SARA Permit Application

Great, thanks Jenn, we'll be back to you soon with the details. We're on expedition this week for white sharks off the Florida east coast and will work on this.

Once we get in the requested details, Chris and I would be happy to fly up to discuss our application and plans with DFO at any time.

Bob

### **ROBERT E. HUETER, Ph.D.**

*Senior Scientist & Director, Center for Shark Research  
Perry W. Gilbert Chair in Shark Research  
Manager, Sharks & Rays Conservation Research Program  
Mote Marine Laboratory  
1600 Ken Thompson Parkway  
Sarasota, FL 34236 USA*

[rhuetter@mote.org](mailto:rhuetter@mote.org)  
Tel: 941-388-1827  
Fax: 941-388-4312  
More info at: [www.mote.org](http://www.mote.org)

On 1/23/2018 8:26 AM, MacDonald, Jennifer wrote:

Hello Bob,  
Sorry for the confusion – the cover letter is a standard letter that indicates the type of information that we may additionally require. Yes, you are correct to assume that it is the addendum to focus on – if you can provide information to those specific questions, it would be very much appreciated.  
Thank you,  
Jenn

**Jennifer MacDonald**  
Species at Risk Management Division  
(902) 407-8175

---

**From:** Robert Hueter [<mailto:rhuetter@mote.org>]  
**Sent:** January-22-18 5:15 PM  
**To:** MacDonald, Jennifer; Chris Fischer  
**Cc:** Sooley, Darrin; Bryan Franks; Fernanda Ubatuba; Ami Meite; Brandon  
**Subject:** Re: Receipt of SARA Permit Application

Dear Jennifer:

Could I ask for a clarification of your request for further information for our permit

application? In your January 10 letter to Chris Fischer you ask for 6 types of information on your first page, and then follow that with a 1.5 page addendum of specific questions. May we assume that if we focus on that addendum and provide the answers to the specific questions asked therein, that will give you the information you require?

Thank you for your assistance with our application.

Bob Hueter

--

**ROBERT E. HUETER, Ph.D.**

*Chief Science Advisor, OCEARCH*

*Senior Scientist & Director, Center for Shark Research*

*Perry W. Gilbert Chair in Shark Research*

*Manager, Sharks & Rays Conservation Research Program*

*Mote Marine Laboratory*

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Fax: 941-388-4312

More info at: [www.mote.org](http://www.mote.org)

On 1/10/2018 9:44 AM, MacDonald, Jennifer wrote:

Hello Chris,

Thank you for your message. As indicated in our notification letter, under the regulations, you will receive a response to your permit application within 90 days from the date on the notification letter. There are instances where we are able to review and respond in less than 90 days, but I cannot guarantee that, especially at this time of year as we are currently receiving a number of permit applications for spring fieldwork.

We have conducted a preliminary review of your application and do have a number of questions or areas of the application for which we would like to request additional information. The attached document outlines a number of specific questions. As detailed in the attached letter, our 90 day review timeline will be suspended until we have received all the necessary information back from OCEARCH and we are able to resume our review.

Should you have any questions or would like clarification on any of the questions in the attached, please do not hesitate to get in touch.

Best regards,  
Jenn

**Jennifer MacDonald**

Species at Risk Management Division

(902) 407-8175

---

**From:** Chris Fischer [<mailto:chris@ocearch.org>]

**Sent:** January-09-18 5:04 PM

**To:** MacDonald, Jennifer

**Cc:** Sooley, Darrin; Sullivan, Katrina; Humphrey, Donald; Bob Hueter; Bryan Franks;



Fernanda Ubatuba; Ami Meite; Brandon  
**Subject:** Re: Receipt of SARA Permit Application

Jennifer,  
Thank you for your reply.  
Do you have any idea on the typical timeline for the review process?  
We will reach out to the other authorities and agencies mentioned in your email below. Thank you for this information.  
I am copying in several of our team members who are working on this process at ocearch.  
If possible, please include them on all future correspondence so we can reply to any questions etc in a timely manner.  
We are grateful for your consideration and hope you have a great 2018.  
All the best,  
Chris

CHRIS FISCHER | Expedition Leader | Founding Chairman  
**P: 435.645.8990 | F: 435.645.7077 | BE  
ENGAGED: OCEARCH.ORG**

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On Jan 8, 2018, at 11:25 AM, MacDonald, Jennifer  
<[Jennifer.MacDonald@dfo-mpo.gc.ca](mailto:Jennifer.MacDonald@dfo-mpo.gc.ca)> wrote:

Hello Mr. Fischer,

I have attached the official letter acknowledging receipt of your applications to Fisheries and Oceans Canada (Maritimes and Newfoundland and Labrador Regions) for a *Species at Risk Act* Permit. Your applications will be reviewed and a response informing you of the decision to issue or decline to issue a permit will be provided to you following this review.

Please note, it remains your (OCEARCH's) responsibility to meet other requirements of federal, provincial and municipal authorities and agencies, including, but not limited to, the following:

- Licence to Fish for Scientific, Experimental, Educational, Public Display or Aquatic Invasive Species Control Purposes: If the proposed activities include fishing for educational purposes, public display, scientific purposes or to control aquatic invasive species, applicants will require a licence pursuant to Section 52 of the *Fishery (General) Regulations*. The application forms for the respective DFO regions are attached. For more information in Maritimes Region, please contact [RegionalLicensing.XMAR@dfo-mpo.gc.ca](mailto:RegionalLicensing.XMAR@dfo-mpo.gc.ca) and in Newfoundland and Labrador Region, please contact [experimental.licenses@dfo-mpo.gc.ca](mailto:experimental.licenses@dfo-mpo.gc.ca);

- Foreign Fishing Vessel Licence;
- Permission from Parks Canada Agency regarding activities in proximity to Sable Island  
([https://www.pc.gc.ca/apps/rps/page1\\_e.asp](https://www.pc.gc.ca/apps/rps/page1_e.asp)).

Should you have any questions, please contact me at the information below.

Regards,  
Jennifer

**Jennifer MacDonald**

Species at Risk Biologist | Biologiste des espèces en péril  
Species at Risk Management Division | Division de la gestion des espèces en péril  
Ecosystem Management | Gestion des écosystèmes  
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Email | Courriel: [jennifer.macdonald@dfo-mpo.gc.ca](mailto:jennifer.macdonald@dfo-mpo.gc.ca)

<SARA-Application-Received-signed.pdf><Revised Section 52  
Licence Request Form (October 2017).docx><APPLICATION  
FOR EXPERIMENTAL LICENCE.doc>

## MacDonald, Jennifer

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**From:** MacDonald, Jennifer  
**Sent:** January-29-18 1:35 PM  
**To:** Sooley, Darrin  
**Subject:** OCEARCH - touching base

**Follow Up Flag:** Follow up  
**Flag Status:** Completed

Hi Darrin,

Just thought I'd touch base about the OCEARCH permit application to see how we should continue to coordinate/go forward from here.

We have a review and approval form that we use regionally to document impacts/alternatives considered/conditions...I have started drafting that document and can share it with you once I've cleaned it up a bit and we have the additional information from OCEARCH – I'd appreciate your input to it as well. We generally have our regional manager sign off on this document as well as the actual permit. Would it make sense to have Donald and Katrina sign-off on the same document?

I'm hoping to meet with our shark scientists fairly soon again to get some additional input on conditions they think would be appropriate for the permit. Should we also plan a meeting with SAR program and Science in the two regions to talk about those conditions? How do you think we should collaborate on drafting the permit itself?

I know we're still waiting on the additional information from OCEARCH, but Donald was just asking about next steps, so I thought it would be good for us to work out a bit of a plan. Let me know your thoughts or if it's easiest we could have a quick chat to figure things out.

Thanks!  
Jenn

### Jennifer MacDonald

Species at Risk Biologist | Biologiste des espèces en péril  
Species at Risk Management Division | Division de la gestion des espèces en péril  
Ecosystem Management | Gestion des écosystèmes  
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## MacDonald, Jennifer

---

**From:** MacDonald, Jennifer  
**Sent:** January-29-18 12:08 PM  
**To:** Bowlby, Heather; Joyce, Warren  
**Subject:** RE: OCEARCH permit application  
**Attachments:** Draft conditions for discussion.docx

**Follow Up Flag:** Follow up  
**Flag Status:** Completed

Oops...the attachment would help ☺

**Jennifer MacDonald**  
Species at Risk Management Division  
(902) 407-8175

---

**From:** MacDonald, Jennifer  
**Sent:** January-29-18 12:05 PM  
**To:** Bowlby, Heather; Joyce, Warren  
**Subject:** OCEARCH permit application

Hi Heather and Warren,

I just wanted to touch base about the OCEARCH permit application. I have sent the list of our additional questions to OCEARCH and am waiting to get that information back – I'm hoping to have that from them within the next week or two. As a next step to reviewing the permit application, I would like to meet with both of you again to get a sense of what type of permit conditions we should consider.

Would it be premature to meet, at least initially, to talk about conditions before we have the extra information from OCEARCH? If you think a discussion could be helpful at this point, I'd like to set something up for fairly soon, given the Program's time limits on providing permit decisions and that we have to coordinate with Newfoundland Region.

I have a draft of the approaches that OCEARCH identified to minimize impacts, with additional items/questions for us to think about with regards to conditions (attached). This is very preliminary and I would very much appreciate your input to this.

Once we have all the additional information from OCEARCH, we will likely need to have another discussion with SAR program and Science here and in Nfld Region.

Let me know if you would prefer to wait until we've had the additional input; if not, I'll set something up soon.

Thanks so much!  
Jenn

**Jennifer MacDonald**  
Species at Risk Biologist | Biologiste des espèces en péril  
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No information has been removed or severed from this page

The following measures were proposed by OCEARCH to minimize the impacts of the activities:

- using gear that will minimize chance that animals are gut-hooked;
- minimize animal struggles
- all research procedures will be conducted within 20 minutes;
- while on the research platform:
  - oxygenated seawater will be supplied via a hose and mouthpiece to the animal's gills at all times while being restrained;
  - a tail rope will be used to prevent the animal from causing harm to itself and others;
  - the head and eyes will be covered with wet terrycloth towel to reduce animal stress and keep eyes moist;
  - the skin will be kept wet during in-air procedures to prevent drying
  - animal stress will be monitored by observing skin colouration and animal activity; if acute stress is observed, the animal will be released immediately.

**Commented [JM1]:** What does this include?

In addition, the permit could require:

- should we include any restrictions related to age of individuals/ male vs female?
  - Found a reference to limiting tagging/lifting onto platform to sharks under 18 feet (impacts of being on lift may be greater in larger animals)
  - One way to minimize potential effects from the SPOT tags is to only target sharks that are larger than 13 feet, which can be estimated visually and to use a single bolt attachment or a tag in which the bolt corrodes after a certain amount of time.
  -

Catch and release:

- circle hooks (less release mortality than with J hooks)
- size of the hook?
  - Report from NOAA req'd circle hooks to be 13 inches long by 7 inches wide with a 5 inch gap b/n the point and shank
- Hooks should not be barbed
- Hooks should be galvanized, not stainless steel, which would facilitate their deterioration and dropping from a shark in case the hook cannot be removed.
- The capture of sharks would involve a braided steel cable for a leader, which cannot be severed by their sharp teeth. While steel cable can be abrasive to shark skin during the capture process, at times causing raw wounds, the braided cable leader would be embedded into the center of nylon rope, which is soft and flexible and prevents the cable from coming into contact with the skin. Thus, the hybrid cable/nylon rope leader is a reasonable method to use on captured adult White Sharks while preventing the occurrence of raw abrasive wounds. The cable/rope hybrid is also easier and safer for researchers to handle while controlling the shark near the catch boat.
- a method being considered to reduce the chance of hooking a White Shark in the stomach or throat is the use of a "deep hook preventer" or blocker device. The device would be incorporated in the fishing gear, very close to the hook, to prevent the shark from ingesting the hook beyond the mouth cavity. The device is a straight length of PVC pipe that is longer than the width of the mouth.

**Commented [JM2]:** Reviewer of the NOAA document indicated hooks should be smaller; rationale for this size was that sharks can straighten smaller hooks

**Commented [JM3]:** From NOAA document

Use of the platform:

- Not allow sharks to be lifted onto the platform? Instead of being lifted from the water, use a methodology to restrain the White Sharks alongside boat so that tagging could take place while the shark is completely submerged
- If allowed, time limit?
- If allowed, possible ways to provide additional support on the platform?

Time:

- Limit total time from hooking to releasing sharks (not just limit time on the lift); found a reference from NOAA that time from hooking to releasing should be b/n 40-90 minutes

Tags

- Number, placement, type

Requirements to cease work and contact DFO immediately:

- Shark is hooked in certain location (e.g. throat)?
- Any mortality/significant injury?

Observers on board?

## MacDonald, Jennifer

---

**From:** MacDonald, Jennifer  
**Sent:** February-01-18 8:46 AM  
**To:** Bowlby, Heather; Joyce, Warren  
**Cc:** Gromack, Aimee; Brennin Houston, Ree  
**Subject:** FW: Receipt of SARA Permit Application  
**Attachments:** OCEARCH Responses to DFO questions for SARA permit.pdf

**Follow Up Flag:** Follow up  
**Flag Status:** Flagged

Good morning,

We've received the additional information from OCEARCH that we requested to complete their permit application. I'd like to set up a meeting early next week to discuss the information provided and start discussing the potential conditions for a SARA permit, if that works for everyone. I am working on drafting a permit evaluation document, which documents what activity is being proposed and whether the applicant has met all the necessary pre-conditions for a SARA permit; I will incorporate this additional information from OCEARCH into that document and send that around in advance of a meeting as well.

I've reviewed the information in the attached and I think they have addressed our questions well. I will plan to go back to OCEARCH and confirm that we have received the necessary information and our permitting timeline will resume, unless anyone flags anything outstanding that they did not feel was properly addressed in the attached.

Thanks so much!

Jenn

**Jennifer MacDonald**  
Species at Risk Management Division  
(902) 407-8175

---

**From:** Robert Hueter [mailto:rhoeter@mote.org]  
**Sent:** January-31-18 5:21 PM  
**To:** MacDonald, Jennifer  
**Cc:** Chris Fischer; Sooley, Darrin; Bryan Franks; Fernanda Ubatuba; Ami Meite; Brandon; Brett McBride  
**Subject:** Re: Receipt of SARA Permit Application

Dear Jenn:

Please accept the attached document we have prepared to address DFO's request for additional information on OCEARCH's SARA permit application.

We trust this document will provide the information needed to answer DFO's concerns about our proposed project in Atlantic Canada waters. If you have any further questions or needs for our application, please do not hesitate to contact us as soon as possible.

We are working on the other license applications that you kindly sent to us and will submit those shortly. Meanwhile, we look forward to DFO granting our SARA permit within 90 days so that we can proceed



with our expedition planning.

Thanks very much, Jenn, for all your help guiding us through this process.

Best regards,  
Bob

**ROBERT E. HUETER, Ph.D.**

*Chief Science Advisor, OCEARCH  
Senior Scientist & Director, Center for Shark Research  
Perry W. Gilbert Chair in Shark Research  
Manager, Sharks & Rays Conservation Research Program  
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Best regards,  
Jenn

**Jennifer MacDonald**

Species at Risk Management Division  
(902) 407-8175

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**From:** Chris Fischer [<mailto:chris@oceanarch.org>]

**Sent:** January-09-18 5:04 PM

**To:** MacDonald, Jennifer

**Cc:** Sooley, Darrin; Sullivan, Katrina; Humphrey, Donald; Bob Hueter; Bryan Franks; Fernanda Ubatuba; Ami Meite; Brandon  
**Subject:** Re: Receipt of SARA Permit Application

Jennifer,

Thank you for your reply.

Do you have any idea on the typical timeline for the review process?

We will reach out to the other authorities and agencies mentioned in your email below. Thank you for this information.

I am copying in several of our team members who are working on this process at oearch.

If possible, please include them on all future correspondence so we can reply to any questions etc in a timely manner.

We are grateful for your consideration and hope you have a great 2018.

All the best,

Chris

**CHRIS FISCHER** | Expedition Leader | Founding Chairman

**P: 435.645.8990 | F: 435.645.7077 | BE**

**ENGAGED: OCEARCH.ORG**

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On Jan 8, 2018, at 11:25 AM, MacDonald, Jennifer <[Jennifer.MacDonald@dfo-mpo.gc.ca](mailto:Jennifer.MacDonald@dfo-mpo.gc.ca)> wrote:

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- Licence to Fish for Scientific, Experimental, Educational, Public Display or Aquatic Invasive Species Control Purposes: If the proposed activities include fishing for educational purposes, public display, scientific purposes or to control aquatic invasive species, applicants will require a licence pursuant to Section 52 of the *Fishery (General) Regulations*. The application forms for the respective DFO regions are attached. For more information in Maritimes Region, please

contact [RegionalLicensing.XMAR@dfo-mpo.gc.ca](mailto:RegionalLicensing.XMAR@dfo-mpo.gc.ca) and in Newfoundland and Labrador Region, please contact [experimental.licenses@dfo-mpo.gc.ca](mailto:experimental.licenses@dfo-mpo.gc.ca);

- Foreign Fishing Vessel Licence;
- Permission from Parks Canada Agency regarding activities in proximity to Sable Island ([https://www.pc.gc.ca/apps/rps/page1\\_e.asp](https://www.pc.gc.ca/apps/rps/page1_e.asp)).

Should you have any questions, please contact me at the information below.

Regards,  
Jennifer

**Jennifer MacDonald**

Species at Risk Biologist | Biologiste des espèces en péril

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Email | Courriel: [jennifer.macdonald@dfo-mpo.gc.ca](mailto:jennifer.macdonald@dfo-mpo.gc.ca)

<SARA-Application-Received-signed.pdf><Revised Section 52 Licence Request  
Form (October 2017).docx><APPLICATION FOR EXPERIMENTAL  
LICENCE.doc>

**RESPONSE TO DFO 10 JANUARY 2018 REQUEST FOR FURTHER INFORMATION  
OCEARCH APPLICATION FOR SARA PERMIT  
31 JANUARY 2018**

***First group of clarifying questions from DFO and OCEARCH responses:***

**Proposed Activities**

- Please provide more detailed information on the methods that are being proposed to tag and sample White Shark, including:
  - What tools/techniques will be used to sight individuals before they are tagged?
  - How will individuals be captured (e.g., what type of gear? what type of hook/bait? what type/amount of chum? where will chum be obtained?)
  - How will the shark be transferred to the main vessel/lift? How will the shark's body be supported while out of the water?
  - Will seawater pass over both sets of gills while the shark is out of water? What is the rate of flow of seawater over the gills?
  - With respect to the SPOT tags, please provide greater details on the process that will be used to attach the tags (e.g., number of bolts that will be used, the drill that will be used and size of the drill bit, the size and material of the bolts, sterilization of the drill bit/bolts, weight of the tags). Will an anti-fouling agent be applied to the tags? When do tags release and what is the release mechanism of the SPOT tags after deployment; will any structure(s) remain in the fins?
- Please provide the rationale for proposing to tag 20 sharks.
- Please provide a copy of OCEARCH's animal care protocol.

• **Proposed methods:**

- **Tools/techniques to sight individuals:** Chum is used to attract individual white sharks in the study area to the small Contender fishing boat and the large research vessel M/V OCEARCH. Observers continually scan the waters around the vessels for signs of white shark activity, including fins at the surface, large objects below the surface, and turbulence associated with swimming and/or feeding activity. We also deploy drones to search for white sharks in the vicinity of the boats, and occasionally have used spotter planes. When a white shark is sighted, the Contender targets its fishing activities to attract and capture that shark.
- **Method of capture:** To attract sharks we use a combination of chumming methods including chum bags, chum boxes, bait tanks, chum tubes, and decoys. The chum bag is a mesh bag lashed to the side of a vessel and allowing the chum material to leach out via surface currents. The chum box is suspended in the water column on a rope and allows the chum to leach out at depth when the bottom current is moving. Bait tanks filled with chum are used to pump out water soaked in chum material into the vicinity to attract sharks. The chum tube is a PVC tube (with the

bottom closed) that has small holes drilled in the sides and that hangs over the side of the vessel with chum material in the tube. We use a hoe (blade on bottom of a stick) and press it up and down, mashing and eviscerating all material in the tube. The material then comes out of the tube in tiny pieces and oils. The decoy method uses chum placed inside a seal decoy made from neoprene and deployed behind the support vessel at a distance of approx. 60 m behind the vessel.

The chum we use to attract white sharks consists of whale blubber and oil, mackerel and tuna, and/or menhaden oil. The marine mammal material used in U.S. waters is obtained for OCEARCH from dead, stranded whales by members of the Northeast Marine Mammal Stranding Network, and is provided to OCEARCH under a permit from NOAA to OCEARCH. Fish and fish oil chum are obtained from a commercial seafood dealer. Upon approval of our SARA permit application to conduct research on the white shark in Atlantic Canada, we will seek a marine mammal permit from the relevant agency in Canada to authorize OCEARCH to use marine mammal material in this project in Canadian waters.

Once a shark is attracted by the chum, we use one of two different hook sizes to capture the shark, either a 20/0 or 27/0 circle hook with zero offset, both specifically designed by Mustad for OCEARCH and not available to the public. A 20/0 hook, which is about the size of the palm of a hand and manufactured by Mustad to be 5X strength, is used in almost all cases. These hooks are rigged with a crossbar bite-blocker about 30 cm up the leader to prevent the shark from swallowing the bait (see photo below). The only instance for using a 27/0 hook is if an extremely large shark appears at the surface right next to the fishing boat, where we can see the size of the shark and control the bite, guaranteeing that the hook is engaged in the corner of the shark's mouth and the shark does not swallow the bait. When we use this hook it is always with a buoy or other blocker to prohibit the shark from swallowing the bait on an aggressive bite.



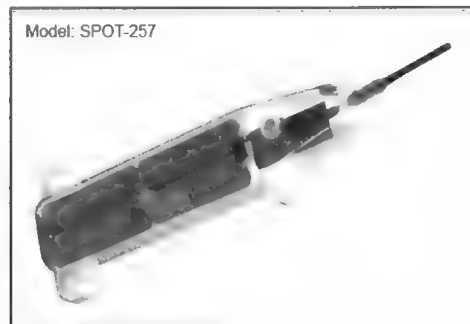
White shark capture rig with 20/0 circle hook (white arrow) and crossbar bite-blocker (red arrow) preventing shark from swallowing the hook.

We use stainless steel wire rope 3/32" or 1/8" attached to the hook. The leader length is approx. 10 m and is attached to a Samson braid rope with elasticity properties that help reduce hard shock when the initial struggle ensues. We use this leader length in case the shark rolls up in the line to ensure the shark cannot bite through the rope and escape, carrying away a hook and leader. In addition, we often embed our leaders inside a three-strand rope to give the leader a thicker diameter, which is better for the shark if it rolls, as the thicker diameter does not cut into the shark's skin and is much easier to unwrap. These are safeguards that are seldom needed, because our methods of bringing the shark under control rarely allow the shark to roll. The heavier tackle we use allows us to keep enough pressure on the shark that the line is stretched tight and the shark cannot turn and roll. This would not be possible using even the heaviest rod and reel rig. When the shark takes the bait we immediately determine the direction it is swimming and move the small fishing boat in front of it. By getting out in front of the shark and keeping the line tight, the shark has a difficult time turning and cannot swallow the bait. Most species of sharks, especially white sharks, are designed to move forward through the water and we use this to our advantage, putting enough pressure on the shark to control its head and keep it swimming forward. With the coordinated efforts of boat handling and line handling, we quickly take control of the shark, instead of getting in a prolonged back and forth battle. In a matter of a few minutes we get the shark to adopt a behavior that some animal handlers have referred to as "learned helplessness," in which the shark submits to capture and does not fight, thus reducing its stress level.

- Transfer and support of the sharks: With the fishing boat in the lead and the submissive shark in a following position, the shark typically follows the boat even when we slack up on the line completely. At this point we slowly and carefully swim the shark back to the M/V OCEARCH mothership, anchored nearby. Within typically 5-10 minutes the shark is guided onto the OCEARCH's hydraulic lift that has been lowered off the starboard side below the waterline. The lift has side guides and an end gate that keep the shark from swimming off the lift. The lift is then slowly raised above the water line and the shark settles onto the platform, first on its side in order to take blood, implant an acoustic tag in the abdominal cavity, perform ultrasound tests, and conduct other research procedures. After 5-7 minutes the shark is then rolled to an upright position and the remaining procedures, including attachment of satellite tags, are performed. (On very large animals the lift is lowered as necessary to buoy the shark slightly so that the roll can be effected.) While on the lift the sharks remain still and do not struggle. The OCEARCH team has handled 120 white sharks in this manner and taken blood samples at the beginning and end of handling, and have found stress levels remain relatively low throughout the handling procedure. Laying the sharks on an elevated platform quiets the animals and prevents them from attempting the type of struggling they tend to do while still submerged in seawater. There is no evidence of any internal damage to the shark with this procedure and the resulting satellite tag tracks demonstrate the animals' ability to continue their normal behavior and health after release. Thus, the OCEARCH method reduces the potential for harm and trauma to the sharks,

allows for a comprehensive suite of research procedures to be performed, and is safe for all people involved.

- Ventilation of the shark: On the lift, the hook is removed from the jaw and cool, natural seawater is pumped through a hose and PVC tube into the shark's buccal cavity the entire time on the lift. The tube terminates in a mouthpiece that allows for simultaneous flushing of the gills on both sides of the head. Rate of flow over the gills can be adjusted with a valve and generally is set at about 144 l/min, with a maximum rate of about 208 l/min, but less than maximum is preferred to allow for optimum gas exchange. A vinyl bib is placed under the head and gills to allow the flowing seawater to pool and facilitate better, more natural oxygenation. Also during this time a wet terrycloth towel is kept over the shark's head and eyes, to protect sensitive areas and calm the animal, and seawater is poured over the shark to keep the skin wet and the body cool.
- Attachment of SPOT tags: While the shark is in the upright position on the lift, a team of two researchers attaches a SPOT satellite tag to the leading edge of the shark's first dorsal fin. The tag used with large white sharks is a Wildlife Computers Model SPOT-257 (see illustration below) measuring 162 x 57 x 20 mm and weighing 160 g. Although the manufacturer rates the life of this tag to be 1,200 days, this model of SPOT tag has presented a battery life of up to five years in previous OCEARCH applications.



To attach the tag, four holes are drilled in the thick part of the first dorsal fin, using a Ryobi 18V cordless electric drill with a 13/64" bit. The bit is cleaned and sterilized in alcohol before use. No local anesthetic is necessary as the sharks have no significant pain receptors in the fins, which are largely composed of proteinaceous ceratotrichia and cartilaginous elements with minimal blood supply. The four holes are lined up with mounting holes in the tag and hardware consisting of alcohol-sterilized nylon bolts, stainless locknuts and plastic spacers are used to bolt the tag to the fin, using a Black & Decker 12V cordless electric nut driver. This hardware is the standard kit provided by the tag manufacturer, Wildlife Computers, for attachment on marine animals. At least three days prior to deployment the tag is coated with an antifouling compound, either clear PropSpeed (Oceanmax) or black Micron 66 (Interlux). Both compounds are widely used to reduce fouling of marine animal tags. As previously mentioned the tags' battery life is up to approx. five years, therefore the hardware is designed to retain the tag on the fin for about





- Animal care protocols: On all previous expeditions, OCEARCH's research on live animals has been covered by Institutional Animal Care and Use Committee (IACUC) approved plans that each individual OCEARCH collaborator obtains from their institution. An example of one of these IACUC plans can be provided upon request. However, as of February 2017, OCEARCH has been officially affiliated with Jacksonville University (JU) in Jacksonville, Florida, and JU has recently established an IACUC committee and will be reviewing the overarching OCEARCH animal care plan for all future expeditions, including the proposed one in Atlantic Canada. Thus that plan is in preparation at the moment and we will provide a copy of it to DFO once it is approved by the JU IACUC. We understand that final approval of our DFO permit will be contingent upon having an approved IACUC plan in place for the expedition.

***Second group of clarifying questions from DFO and OCEARCH responses:***

**Alternatives Considered**

- SARA permits may only be issued when it has been demonstrated that all reasonable alternatives that would reduce the impact on the species have been considered. Please provide a more detailed assessment of the alternatives considered and an evaluation of why the chosen methodology is preferable, including:
  - Information on alternate tag types (PSAT or acoustic tags) and the associated methodology for attaching those tags (e.g., external attachments that do not require capture/removing the shark from water/surgical implantation). Please include in your assessment the rationale for why SPOT tags are the preferred data collection approach to answer the scientific research questions identified.
  - Information on alternative approaches to gathering biological samples (e.g., fin clips, tissue plugs).
- Alternative tagging and sampling methodology:
  - Alternatives to SPOT tags: In addition to the SPOT fin-mounted tags, we implant a Vemco (Canada) acoustic tag into the shark's abdomen and in many cases also attach a PSAT satellite tag to the shark's flank below the first dorsal fin. Among the PSATs we are deploying is a new technology tag developed by the European Space Agency (ESA), of which Canada is an Associate Member. OCEARCH is currently testing the prototype of this ESA tag on white sharks in U.S. waters and we hope to have a fully operational version available for the Atlantic Canada expedition. This tag functions with a new, ESA-developed chip technology that allows it to collect more data with greater battery efficiency and lower cost than current, commercially available tags. It also is designed to operate as both a PSAT and SPOT in one tag, reducing potential stress on the animal with one less tag. In this year's testing phase, however, we are testing the ESA tag in conjunction with a fin-mounted Wildlife Computers SPOT tag, to validate the ESA tag's geolocation data.

SPOT, PSAT, and acoustic tags do very different things and collect different types of data. They are not interchangeable, but instead provide answers to different research questions. To obtain the most precise, near real-time geolocation data from an animal that is widely ranging to areas previously unknown, SPOT tags are the best (as long as the animal occasionally surfaces, which white sharks do). To obtain archived temperature/depth data but much less precise geolocation tracks after-the-fact (not in near real-time), PSATs can be used. And to detect the arrival of an animal in an area where underwater acoustic receivers have been deployed (normally well-studied inshore areas), acoustic tags are useful. This means that for the early discovery phase of understanding an animal's large-scale movements and migration, SPOT tags are the most effective in revealing the precise tracks, no matter where the animals may travel in the ocean. This is the phase that we are still in for the Atlantic white shark project, thus the deployment of SPOTs on the Atlantic Canada expedition is crucial and cannot be substituted with PSAT or acoustic tags. The SPOT tags also are highly effective as educational tools to communicate with the public in ways that PSATs and acoustic tags cannot simulate. OCEARCH's Global Shark Tracker ([www.ocearch.org](http://www.ocearch.org)) provides the near real-time data from our sharks' SPOT tags on a publicly accessible web platform, thereby sharing with millions of people the results of this research. The educational impact of this is immense and the personal connections that people make to OCEARCH research animals, through the SPOT tag data, builds huge public support for marine research and conservation.

- Alternatives for biological sampling: Although some types of biological sampling described in our research plan for Atlantic Canada theoretically could be done by harpoon, the following require catching and controlling the animal out of the water to obtain samples: 1) blood for a broad range of physiological tests and health assessment; 2) skin mucus, gill surface, and cloacal swabs for microbial samples; 3) parasites removed from multiple locations on animal, for parasitological studies; and 4) semen for studies of male reproductive biology. Attempting to obtain these samples in the water runs the risk of sample contamination, loss of sample, and infections in the shark. In addition, our research using ultrasound to determine female pregnancy and photography of eyes and tails for morphological studies would not be possible without restraining the animals under controlled conditions. (Please refer to the list of 2018 Expedition Projects for OCEARCH North Atlantic White Shark Research on pages 35-41 of our SARA application for further details on these necessary methodologies and objectives.)

***Third group of clarifying questions from DFO and OCEARCH responses:***

**Effects of the Proposed Activities and Measures to Minimize the Impacts:**

- Please provide evidence to support the conclusions that the proposed activities will not have significant effects (as indicated in Section 11 of the application), including:
  - Evidence to support the statement that catch, removal from the water, and release of White Shark has a short-term (less than 6 hour) alteration of shark's natural behaviour, followed by full recovery and resumption of natural behaviour.
- What are the anticipated effects of approaching an individual with a vessel? Will the individuals be followed? How long will a vessel remain in proximity?
- How will the intensity and duration of animal struggles be minimized? Does OCEARCH limit the amount of time they will engage with a single individual in the effort to catch it?
- How will it be assured that animals are restrained by the jaw (and not gut-hooked)?
- What protocols will be in place to respond if stress is too high or oxygen too low in order to prevent serious health issues?
- How was it determined that 15-20 minutes is the appropriate amount of time to keep an individual on board the vessel? Is this time common practice in scientific research for White Sharks, other sharks or other pelagic fish?

- Effects of proposed activities:
  - Time course of effects: Onboard studies of physiological stress are conducted by taking blood samples from the shark in the first minute and in the last minute on the ship's lift. This research has confirmed that stress levels in the large white sharks are relatively low when they are first brought onboard and stay low, and may even decline, during their 15-20 minutes on the lift. (This does not always hold for the very young white sharks, which sometimes appear to experience a higher amount of physiological stress from capture. Nor does it apply to other shark species, such as hammerheads, which are highly vulnerable to capture and restraint. However, we are not proposing to catch the very small white sharks or the other shark species in Atlantic Canada.) Furthermore, post-release behavioral studies by OCEARCH collaborating scientists (N. Whitney et al.) using accelerometers attached to the sharks have shown recovery and resumption of natural swimming behavior within approx. 6 hr after release. In addition, our SPOT tag data on the released sharks demonstrate their survivorship and continuation of normal behavior over the long term. Comparisons between our satellite tag results and acoustic studies in Massachusetts waters by biologists from the Massachusetts Division of Marine Fisheries demonstrate that OCEARCH-tagged sharks show very similar percentages of post-release residency vs. migratory behavior (leaving the tagging site) to other sharks acoustically tagged in the water by the Mass. DMF.
  - Effects of vessels approaching: Unlike in some other studies, we do not chase white sharks to study them, but instead we attract them to our rigs with chum and

bait. We have found that white sharks in the northwest Atlantic, where they are not baited for ecotourism activities, are generally wary and cautious around vessels and fishing rigs. This contrasts with white shark behavior in South Africa where diving ecotourism with these sharks is quite popular. Thus, following or chasing the sharks in Canadian waters serves no purpose other than to scare off the animals. Upon release of a tagged shark, we sometimes follow the animals for a few minutes by boat or drone to obtain video and ensure that the shark's swimming is strong and healthy.

- Controlling the intensity and duration of capture: Explained above on pages 2-4.
- Ensuring jaw-hooking: Explained above on page 2.
- Dealing with physiological stress: As previously explained the blood work provides a measure of stress at the start of the procedure. We also monitor external signs of stress such as skin coloration, presence of blood pooling, gill movements, and overall response to being handled. If at any point in the 15-20 minute procedure we detect increased stress in the animal, we can take a blood sample and quickly evaluate the shark's condition. If it is decided that physiological stress is increasing to a level of concern, we end the procedure on the lift and release the shark. For small animals under significant stress, intracoelomic fluids can be introduced to stabilize their body chemistry. This is not possible with the very large body sizes of mature white sharks, due to the amount of fluid that would need to be administered, so premature release is the preferred response for those large animals.
- Duration on the lift: The 15-20 minute limit on the lift is self-imposed, based on our team's decades of experience, with our researchers and aquatic veterinarians handling hundreds of sharks of dozens of species in similar scenarios, on the dry platform with seawater irrigation of the gills. As explained above, measurements of stress biomarkers while the sharks are on the lift have confirmed this duration to be an appropriate amount of time to conduct our studies but not risk the health of the shark.

---

***Prepared by:***

***Robert E. Hueter, Ph.D.***  
***Chief Science Advisor, OCEARCH***  
***rhuetter@mote.org***

***31 January 2018***

## MacDonald, Jennifer

---

**From:** MacDonald, Jennifer  
**Sent:** February-01-18 8:26 AM  
**To:** Sooley, Darrin  
**Subject:** RE: Receipt of SARA Permit Application  
**Attachments:** SARA Permit\_Assessment and Approval Form\_draft.docx

I've attached the very preliminary draft just so you can see the layout of the document...it still has a lot of notes/questions to fill in and I will add the details on the activities proposed from the document we've just received from OCEARCH. I would appreciate if you don't distribute it at this point, as it needs work. I had tentatively added Katrina's name to the bottom of the form for the approvals, thinking we could perhaps have a single approval document to save ourselves some work! If you could send me the format for the Permit Rationale you use, I could check if there are things included on your form that are not captured on ours and add those in. I think in this case, it's more efficient if we can use the same form, I'm open to tweaking ours to meet the needs of both regions, if you agree.

Cheers,  
Jenn

**Jennifer MacDonald**  
Species at Risk Management Division  
(902) 407-8175

---

**From:** Sooley, Darrin  
**Sent:** February-01-18 8:22 AM  
**To:** MacDonald, Jennifer  
**Subject:** RE: Receipt of SARA Permit Application

Jenn:

Ok. I will appreciate seeing the form as soon as you can it does not have to be perfect, we have not been using such a form so I would appreciate seeing what it contains so I can share and discuss with Sue and Katrina on possibility/requirement for us to develop a similar form. We will be developing a Permit Rationale for this as we do with any other permit.

Darrin

---

**From:** MacDonald, Jennifer  
**Sent:** February-01-18 8:43 AM  
**To:** Sooley, Darrin  
**Subject:** RE: Receipt of SARA Permit Application

No problem. I will review the information submitted as well and pass it along to our scientists. I will keep working on the review document as well, and send that along to you as soon as possible.

Cheers,  
Jenn

**Jennifer MacDonald**  
Species at Risk Management Division  
(902) 407-8175

---

**From:** Sooley, Darrin  
**Sent:** February-01-18 7:55 AM  
**To:** MacDonald, Jennifer  
**Subject:** RE: Receipt of SARA Permit Application

Jennifer:

I will have a look but will be next week before I can provide anything in terms of response. In meetings all day today most of tomorrow and Branch meeting next Monday and Tuesday.

Darrin

---

**From:** Robert Hueter [<mailto:rhoeter@mote.org>]  
**Sent:** January-31-18 5:51 PM  
**To:** MacDonald, Jennifer  
**Cc:** Chris Fischer; Sooley, Darrin; Bryan Franks; Fernanda Ubatuba; Ami Meite; Brandon; Brett McBride  
**Subject:** Re: Receipt of SARA Permit Application

Dear Jenn:

Please accept the attached document we have prepared to address DFO's request for additional information on OCEARCH's SARA permit application.

We trust this document will provide the information needed to answer DFO's concerns about our proposed project in Atlantic Canada waters. If you have any further questions or needs for our application, please do not hesitate to contact us as soon as possible.

We are working on the other license applications that you kindly sent to us and will submit those shortly. Meanwhile, we look forward to DFO granting our SARA permit within 90 days so that we can proceed with our expedition planning.

Thanks very much, Jenn, for all your help guiding us through this process.

Best regards,

Bob

**ROBERT E. HUETER, Ph.D.**

*Chief Science Advisor, OCEARCH  
Senior Scientist & Director, Center for Shark Research  
Perry W. Gilbert Chair in Shark Research  
Manager, Sharks & Rays Conservation Research Program  
Mote Marine Laboratory  
1600 Ken Thompson Parkway  
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[rhuetter@mote.org](mailto:rhuetter@mote.org)  
Tel: 941-388-1827  
Fax: 941-388-4312  
More info at: [www.mote.org](http://www.mote.org)

On 1/10/2018 9:44 AM, MacDonald, Jennifer wrote:

Hello Chris,

Thank you for your message. As indicated in our notification letter, under the regulations, you will receive a response to your permit application within 90 days from the date on the notification letter. There are instances where we are able to review and respond in less than 90 days, but I cannot guarantee that, especially at this time of year as we are currently receiving a number of permit applications for spring fieldwork.

We have conducted a preliminary review of your application and do have a number of questions or areas of the application for which we would like to request additional information. The attached document outlines a number of specific questions. As detailed in the attached letter, our 90 day review timeline will be suspended until we have received all the necessary information back from OCEARCH and we are able to resume our review.

Should you have any questions or would like clarification on any of the questions in the attached, please do not hesitate to get in touch.

Best regards,  
Jenn

**Jennifer MacDonald**  
Species at Risk Management Division  
(902) 407-8175

---

**From:** Chris Fischer [<mailto:chris@oceanarch.org>]  
**Sent:** January-09-18 5:04 PM  
**To:** MacDonald, Jennifer  
**Cc:** Sooley, Darrin; Sullivan, Katrina; Humphrey, Donald; Bob Hueter; Bryan Franks; Fernanda Ubatuba; Ami Meite; Brandon  
**Subject:** Re: Receipt of SARA Permit Application

Jennifer,  
Thank you for your reply.  
Do you have any idea on the typical timeline for the review process?  
We will reach out to the other authorities and agencies mentioned in your email below. Thank you for this information.  
I am copying in several of our team members who are working on this process at oceanarch.  
If possible, please include them on all future correspondence so we can reply to any questions etc in a timely manner.  
We are grateful for your consideration and hope you have a great 2018.  
All the best,

Chris

CHRIS FISCHER | Expedition Leader | Founding Chairman

**P: 435.645.8990 | F: 435.645.7077 | BE**

**ENGAGED: OCEARCH.ORG**

**OCEARCH**

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On Jan 8, 2018, at 11:25 AM, MacDonald, Jennifer <[Jennifer.MacDonald@dfo-mpo.gc.ca](mailto:Jennifer.MacDonald@dfo-mpo.gc.ca)> wrote:

Hello Mr. Fischer,

I have attached the official letter acknowledging receipt of your applications to Fisheries and Oceans Canada (Maritimes and Newfoundland and Labrador Regions) for a *Species at Risk Act* Permit. Your applications will be reviewed and a response informing you of the decision to issue or decline to issue a permit will be provided to you following this review.

Please note, it remains your (OCEARCH's) responsibility to meet other requirements of federal, provincial and municipal authorities and agencies, including, but not limited to, the following:

- Licence to Fish for Scientific, Experimental, Educational, Public Display or Aquatic Invasive Species Control Purposes: If the proposed activities include fishing for educational purposes, public display, scientific purposes or to control aquatic invasive species, applicants will require a licence pursuant to Section 52 of the *Fishery (General) Regulations*. The application forms for the respective DFO regions are attached. For more information in Maritimes Region, please contact [RegionalLicensing.XMAR@dfo-mpo.gc.ca](mailto:RegionalLicensing.XMAR@dfo-mpo.gc.ca) and in Newfoundland and Labrador Region, please contact [experimental.licenses@dfo-mpo.gc.ca](mailto:experimental.licenses@dfo-mpo.gc.ca);
- Foreign Fishing Vessel Licence;
- Permission from Parks Canada Agency regarding activities in proximity to Sable Island ([https://www.pc.gc.ca/apps/rps/page1\\_e.asp](https://www.pc.gc.ca/apps/rps/page1_e.asp)).

Should you have any questions, please contact me at the information below.

Regards,  
Jennifer

**Jennifer MacDonald**

Species at Risk Biologist | Biologiste des espèces en péril

Species at Risk Management Division | Division de la gestion des espèces en péril



Ecosystem Management | Gestion des écosystèmes  
Fisheries & Oceans Canada | Pêches & Océans Canada  
P.O. Box 1006 Dartmouth N.S. | C.P. 1006 Dartmouth N.E. B2Y 4A2  
Tel | Tél: (902) 407-8175 Fax | Téléc: (902) 426-2331  
Email | Courriel: [jennifer.macdonald@dfo-mpo.gc.ca](mailto:jennifer.macdonald@dfo-mpo.gc.ca)

<SARA-Application-Received-signed.pdf><Revised Section 52 Licence Request  
Form (October 2017).docx><APPLICATION FOR EXPERIMENTAL  
LICENCE.doc>

**Pages 62 to / à 71  
are withheld pursuant to section  
sont retenues en vertu de l'article**

**21(1)(b)**

**of the Access to Information Act  
de la Loi sur l'accès à l'information**

**MacDonald, Jennifer**

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**From:** MacDonald, Jennifer  
**Sent:** February-01-18 8:48 AM  
**To:** Gromack, Aimee  
**Subject:** OCEARCH permit application

Hi Aimee,

All the files for the OCEARCH permit application are here: [R:\Oceans & Habitat\Species at Risk\Permitting\1-Permits\2017\17-WS-Ocearch](#)

If you want to have a chat before I set up the meeting with Science to get caught up, I'm happy to do that!

my day today is fairly open or perhaps early next week.

Cheers,

Jenn

**Jennifer MacDonald**

Species at Risk Biologist | Biologiste des espèces en péril

Species at Risk Management Division | Division de la gestion des espèces en péril

Ecosystem Management | Gestion des écosystèmes

Fisheries & Oceans Canada | Pêches & Océans Canada

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Email | Courriel: [jennifer.macdonald@dfo-mpo.gc.ca](mailto:jennifer.macdonald@dfo-mpo.gc.ca)

## MacDonald, Jennifer

---

**From:** Joyce, Warren  
**Sent:** February-01-18 1:37 PM  
**To:** MacDonald, Jennifer  
**Subject:** RE: Receipt of SARA Permit Application

Thanks,

Skimmed it a little too quickly!

---

**From:** MacDonald, Jennifer  
**Sent:** February-01-18 1:36 PM  
**To:** Joyce, Warren  
**Subject:** RE: Receipt of SARA Permit Application

Thanks Warren – on the next page they indicate that it is a seal decoy with chum inside, made of neoprene and deployed 60m behind the vessel – any other details you'd be looking for?

Jenn

**Jennifer MacDonald**  
Species at Risk Management Division  
(902) 407-8175

---

**From:** Joyce, Warren  
**Sent:** February-01-18 1:12 PM  
**To:** MacDonald, Jennifer; Bowlby, Heather  
**Cc:** Gromack, Aimee; Brennin Houston, Ree  
**Subject:** RE: Receipt of SARA Permit Application

One question,

Page 1, Method of capture: They mention they use "Decoys" but do not mention decoys of what.

I've seen in multiple other media postings and articles that the decoys are seal decoys.

<https://www.youtube.com/watch?v=x--6h49FHso>

<https://www.bostonglobe.com/metro/2017/06/15/this-great-white-shark-has-some-baggage/n24WboThR2yTlv8vD2vKwM/story.html>

Not sure if you would want a clear answer on this from them.

Warren

---

**From:** MacDonald, Jennifer  
**Sent:** February-01-18 8:46 AM  
**To:** Bowlby, Heather; Joyce, Warren  
**Cc:** Gromack, Aimee; Brennin Houston, Ree  
**Subject:** FW: Receipt of SARA Permit Application

Good morning,

We've received the additional information from OCEARCH that we requested to complete their permit application. I'd like to set up a meeting early next week to discuss the information provided and start discussing the potential conditions for a SARA permit, if that works for everyone. I am working on drafting a permit evaluation document, which documents what activity is being proposed and whether the applicant has met all the necessary pre-conditions for a SARA permit; I will incorporate this additional information from OCEARCH into that document and send that around in advance of a meeting as well.

I've reviewed the information in the attached and I think they have addressed our questions well. I will plan to go back to OCEARCH and confirm that we have received the necessary information and our permitting timeline will resume, unless anyone flags anything outstanding that they did not feel was properly addressed in the attached.

Thanks so much!

Jenn

**Jennifer MacDonald**  
Species at Risk Management Division  
(902) 407-8175

---

**From:** Robert Hueter [<mailto:rhueter@mote.org>]  
**Sent:** January-31-18 5:21 PM  
**To:** MacDonald, Jennifer  
**Cc:** Chris Fischer; Sooley, Darrin; Bryan Franks; Fernanda Ubatuba; Ami Meite; Brandon; Brett McBride  
**Subject:** Re: Receipt of SARA Permit Application

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We trust this document will provide the information needed to answer DFO's concerns about our proposed project in Atlantic Canada waters. If you have any further questions or needs for our application, please do not hesitate to contact us as soon as possible.

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Thanks very much, Jenn, for all your help guiding us through this process.

Best regards,  
Bob

**ROBERT E. HUETER, Ph.D.**

*Chief Science Advisor, OCEARCH  
Senior Scientist & Director, Center for Shark Research  
Perry W. Gilbert Chair in Shark Research  
Manager, Sharks & Rays Conservation Research Program  
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Tel: 941-388-1827

Fax: 941-388-4312

More info at: [www.mote.org](http://www.mote.org)

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**Jennifer MacDonald**  
Species at Risk Management Division  
(902) 407-8175

---

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**Sent:** January-09-18 5:04 PM

**To:** MacDonald, Jennifer

**Cc:** Sooley, Darrin; Sullivan, Katrina; Humphrey, Donald; Bob Hueter; Bryan Franks; Fernanda Ubatuba; Ami Meite; Brandon

**Subject:** Re: Receipt of SARA Permit Application

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We will reach out to the other authorities and agencies mentioned in your email below. Thank you for this information.

I am copying in several of our team members who are working on this process at ocearch. If possible, please include them on all future correspondence so we can reply to any questions etc in a timely manner.

We are grateful for your consideration and hope you have a great 2018.

All the best,

Chris

CHRIS FISCHER | Expedition Leader | Founding Chairman

**P: 435.645.8990 | F: 435.645.7077 | BE  
ENGAGED: OCEARCH.ORG**

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On Jan 8, 2018, at 11:25 AM, MacDonald, Jennifer <[Jennifer.MacDonald@dfo-mpo.gc.ca](mailto:Jennifer.MacDonald@dfo-mpo.gc.ca)> wrote:

Hello Mr. Fischer,

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- Foreign Fishing Vessel Licence;
- Permission from Parks Canada Agency regarding activities in proximity to Sable Island ([https://www.pc.gc.ca/apps/rps/page1\\_e.asp](https://www.pc.gc.ca/apps/rps/page1_e.asp)).

Should you have any questions, please contact me at the information below.

Regards,  
Jennifer

**Jennifer MacDonald**

Species at Risk Biologist | Biologiste des espèces en péril

Species at Risk Management Division | Division de la gestion des espèces en péril

Ecosystem Management | Gestion des écosystèmes

Fisheries & Oceans Canada | Pêches & Océans Canada

P.O. Box 1006 Dartmouth N.S. | C.P. 1006 Dartmouth N.E. B2Y 4A2

Tel | Tél: (902) 407-8175 Fax | Téléc: (902) 426-2331

Email | Courriel: [jennifer.macdonald@dfo-mpo.gc.ca](mailto:jennifer.macdonald@dfo-mpo.gc.ca)

<SARA-Application-Received-signed.pdf><Revised Section 52 Licence Request  
Form (October 2017).docx><APPLICATION FOR EXPERIMENTAL  
LICENCE.doc>



**MacDonald, Jennifer**

---

**From:** Joyce, Warren  
**Sent:** February-01-18 4:14 PM  
**To:** Gromack, Aimee  
**Subject:** RE: Receipt of SARA Permit Application

Me too! It was a bit of a shot in the dark but 1 worked out (hopefully the other one will as well).

I'll bring the maps next week for the 5 we have.

---

**From:** Gromack, Aimee  
**Sent:** February-01-18 4:12 PM  
**To:** Joyce, Warren  
**Subject:** RE: Receipt of SARA Permit Application

Great, thanks for the update Warren. I saw an email from John earlier in the year about 2 acoustic detections up in Newfoundland as well.

Really glad to hear that at least one came to Canada! It would be good to get more tags out this year. Maybe you, Heather, and I can talk about the feasibility of this next week.

Aimee

---

**From:** Joyce, Warren  
**Sent:** February-01-18 4:09 PM  
**To:** Gromack, Aimee  
**Subject:** RE: Receipt of SARA Permit Application

Hi Aimee,

Yes, I skimmed the paper a little too quickly! Jennifer pointed the decoy description out as well.

1 of the 5 tagged sharks did come to Canada, the last one that popped off Dec. We still have 1 more which will pop off in a couple weeks, a male. The other three went south.

I haven't been keeping an inventory of sightings or other detections as I've been too busy with my other work. If I recall, there was only the 3 OCEARCH tags and Pumpkin that were up here this year, aside from our tagged animal.

Warren

---

**From:** Gromack, Aimee  
**Sent:** February-01-18 3:24 PM  
**To:** Joyce, Warren  
**Subject:** RE: Receipt of SARA Permit Application

Hi Warren,

I hope all is well. I am looking forward to getting caught up on white shark. Let's get caught up after the OCEARCH meeting next week- I will set up a meeting.

Did any of the sharks with your tags come to Canada? I was also wondering if you have been keeping an inventory of the sightings and acoustic/satellite detections this year?

I see that the second page of the OCEARCH proposal states the decoy is a seal filled with chum.

Cheers,

Aimee

---

**From:** Joyce, Warren  
**Sent:** February-01-18 1:12 PM  
**To:** MacDonald, Jennifer; Bowlby, Heather  
**Cc:** Gromack, Aimee; Brennin Houston, Ree  
**Subject:** RE: Receipt of SARA Permit Application

One question,

Page 1, Method of capture: They mention they use "Decoys" but do not mention decoys of what.

I've seen in multiple other media postings and articles that the decoys are seal decoys.

<https://www.youtube.com/watch?v=x--6h49FHso>

<https://www.bostonglobe.com/metro/2017/06/15/this-great-white-shark-has-some-baggage/n24WboThR2yTlv8vD2vKwM/story.html>

Not sure if you would want a clear answer on this from them.

Warren

---

**From:** MacDonald, Jennifer  
**Sent:** February-01-18 8:46 AM  
**To:** Bowlby, Heather; Joyce, Warren  
**Cc:** Gromack, Aimee; Brennin Houston, Ree  
**Subject:** FW: Receipt of SARA Permit Application

Good morning,

We've received the additional information from OCEARCH that we requested to complete their permit application. I'd like to set up a meeting early next week to discuss the information provided and start discussing the potential conditions for a SARA permit, if that works for everyone. I am working on drafting a permit evaluation document, which documents what activity is being proposed and whether the applicant has met all the necessary pre-conditions for a

SARA permit; I will incorporate this additional information from OCEARCH into that document and send that around in advance of a meeting as well.

I've reviewed the information in the attached and I think they have addressed our questions well. I will plan to go back to OCEARCH and confirm that we have received the necessary information and our permitting timeline will resume, unless anyone flags anything outstanding that they did not feel was properly addressed in the attached.

Thanks so much!

Jenn

**Jennifer MacDonald**

Species at Risk Management Division

(902) 407-8175

---

**From:** Robert Hueter [<mailto:rhoeter@mote.org>]

**Sent:** January-31-18 5:21 PM

**To:** MacDonald, Jennifer

**Cc:** Chris Fischer; Sooley, Darrin; Bryan Franks; Fernanda Ubatuba; Ami Meite; Brandon; Brett McBride

**Subject:** Re: Receipt of SARA Permit Application

Dear Jenn:

Please accept the attached document we have prepared to address DFO's request for additional information on OCEARCH's SARA permit application.

We trust this document will provide the information needed to answer DFO's concerns about our proposed project in Atlantic Canada waters. If you have any further questions or needs for our application, please do not hesitate to contact us as soon as possible.

We are working on the other license applications that you kindly sent to us and will submit those shortly. Meanwhile, we look forward to DFO granting our SARA permit within 90 days so that we can proceed with our expedition planning.

Thanks very much, Jenn, for all your help guiding us through this process.

Best regards,

Bob

**ROBERT E. HUETER, Ph.D.**

*Chief Science Advisor, OCEARCH*

*Senior Scientist & Director, Center for Shark Research*

*Perry W. Gilbert Chair in Shark Research*

*Manager, Sharks & Rays Conservation Research Program*

*Mote Marine Laboratory*

*1600 Ken Thompson Parkway*

*Sarasota, FL 34236 USA*

[rhoeter@mote.org](mailto:rhoeter@mote.org)

Tel: 941-388-1827

Fax: 941-388-4312

More info at: [www.mote.org](http://www.mote.org)

On 1/10/2018 9:44 AM, MacDonald, Jennifer wrote:

Hello Chris,

Thank you for your message. As indicated in our notification letter, under the regulations, you will receive a response to your permit application within 90 days from the date on the notification letter. There are instances where we are able to review and respond in less than 90 days, but I cannot guarantee that, especially at this time of year as we are currently receiving a number of permit applications for spring fieldwork.

We have conducted a preliminary review of your application and do have a number of questions or areas of the application for which we would like to request additional information. The attached document outlines a number of specific questions. As detailed in the attached letter, our 90 day review timeline will be suspended until we have received all the necessary information back from OCEARCH and we are able to resume our review.

Should you have any questions or would like clarification on any of the questions in the attached, please do not hesitate to get in touch.

Best regards,  
Jenn

**Jennifer MacDonald**  
Species at Risk Management Division  
(902) 407-8175

---

**From:** Chris Fischer [<mailto:chris@oceanarch.org>]  
**Sent:** January-09-18 5:04 PM  
**To:** MacDonald, Jennifer  
**Cc:** Sooley, Darrin; Sullivan, Katrina; Humphrey, Donald; Bob Hueter; Bryan Franks; Fernanda Ubatuba; Ami Meite; Brandon  
**Subject:** Re: Receipt of SARA Permit Application

Jennifer,  
Thank you for your reply.  
Do you have any idea on the typical timeline for the review process?  
We will reach out to the other authorities and agencies mentioned in your email below. Thank you for this information.  
I am copying in several of our team members who are working on this process at oceanarch.  
If possible, please include them on all future correspondence so we can reply to any questions etc in a timely manner.  
We are grateful for your consideration and hope you have a great 2018.  
All the best,  
Chris

CHRIS FISCHER | Expedition Leader | Founding Chairman

**P: 435.645.8990 | F: 435.645.7077 | BE**

**ENGAGED: OCEARCH.ORG**

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Form (October 2017).docx><APPLICATION FOR EXPERIMENTAL  
LICENCE.doc>

## **MacDonald, Jennifer**

---

**From:** Sooley, Darrin  
**Sent:** February-02-18 11:29 AM  
**To:** MacDonald, Jennifer  
**Subject:** RE: Receipt of SARA Permit Application

Jenn:

I scanned the two emails that Robert has provided and to me they seem to have answered our questions. I am okay with sending the 'time resumes' letter.

Darrin

---

**From:** MacDonald, Jennifer  
**Sent:** February-01-18 2:56 PM  
**To:** Sooley, Darrin  
**Subject:** RE: Receipt of SARA Permit Application

Hi Darrin – I can send the "time resume" letter to OCEARCH – are you ok with that or do you want more time to look at the info they've sent?

Thanks!

**Jennifer MacDonald**  
Species at Risk Management Division  
(902) 407-8175

---

**From:** Sooley, Darrin  
**Sent:** February-01-18 8:22 AM  
**To:** MacDonald, Jennifer  
**Subject:** RE: Receipt of SARA Permit Application

Jenn:

Ok. I will appreciate seeing the form as soon as you can it does not have to be perfect, we have not been using such a form so I would appreciate seeing what it contains so I can share and discuss with Sue and Katrina on possibility/requirement for us to develop a similar form. We will be developing a Permit Rationale for this as we do with any other permit.

Darrin

---

**From:** MacDonald, Jennifer  
**Sent:** February-01-18 8:43 AM  
**To:** Sooley, Darrin  
**Subject:** RE: Receipt of SARA Permit Application

No problem. I will review the information submitted as well and pass it along to our scientists. I will keep working on the review document as well, and send that along to you as soon as possible.

Cheers,

Jenn

**Jennifer MacDonald**

Species at Risk Management Division

(902) 407-8175

---

**From:** Sooley, Darrin

**Sent:** February-01-18 7:55 AM

**To:** MacDonald, Jennifer

**Subject:** RE: Receipt of SARA Permit Application

Jennifer:

I will have a look but will be next week before I can provide anything in terms of response. In meetings all day today most of tomorrow and Branch meeting next Monday and Tuesday.

Darrin

---

**From:** Robert Hueter [<mailto:rhoeter@mote.org>]

**Sent:** January-31-18 5:51 PM

**To:** MacDonald, Jennifer

**Cc:** Chris Fischer; Sooley, Darrin; Bryan Franks; Fernanda Ubatuba; Ami Meite; Brandon; Brett McBride

**Subject:** Re: Receipt of SARA Permit Application

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Sarasota, FL 34236 USA

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Species at Risk Management Division  
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Jennifer,  
Thank you for your reply.  
Do you have any idea on the typical timeline for the review process?  
We will reach out to the other authorities and agencies mentioned in your email below. Thank you for this information.

I am copying in several of our team members who are working on this process at ocearch.  
If possible, please include them on all future correspondence so we can reply to any questions etc in a timely manner.

We are grateful for your consideration and hope you have a great 2018.

All the best,

Chris

**CHRIS FISCHER** | Expedition Leader | Founding Chairman

**P: 435.645.8990 | F: 435.645.7077 | BE**

**ENGAGED: OCEARCH.ORG**

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Regards,  
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<SARA-Application-Received-signed.pdf><Revised Section 52 Licence Request  
Form (October 2017).docx><APPLICATION FOR EXPERIMENTAL  
LICENCE.doc>

## MacDonald, Jennifer

---

**From:** MacDonald, Jennifer  
**Sent:** February-05-18 8:31 AM  
**To:** Bowlby, Heather; Joyce, Warren; Gromack, Aimee  
**Subject:** RE: OCEARCH permit application

Hi everyone,

Attached are two documents I've been working on in relation to the review of the OCEARCH permit. The first is our overall assessment form, which documents what an applicant is proposing to do and how they have met the permitting conditions under SARA; the second document is an outline of things we may want to consider with respect to various conditions in a permit – this is what I would like to mostly discuss with all of you tomorrow. I've also attached a follow-up email from OCEARCH with some additional information.

Thanks so much!

Jenn



SARA  
Permit\_Assessm...



Draft conditions  
for discussio...



Re: Receipt of  
SARA Permit Ap...

**Jennifer MacDonald**

Species at Risk Management Division  
(902) 407-8175

-----Original Appointment-----

**From:** MacDonald, Jennifer  
**Sent:** February-01-18 11:26 AM  
**To:** MacDonald, Jennifer; Bowlby, Heather; Joyce, Warren; Gromack, Aimee  
**Subject:** OCEARCH permit application  
**When:** February-06-18 10:00 AM-11:00 AM (UTC-04:00) Atlantic Time (Canada).  
**Where:** DFO CONF Dartmouth-1ChallengerDr-VS3-VS324 CONF MPO

Hi all,

I'd like to chat about the additional information we've received from OCEARCH as well as identify conditions for the permit. I will send out some additional documents we can use for the meeting in advance.

Thanks,

Jenn



Fisheries and Oceans  
Canada

Pêches et Océans  
Canada

FILE NO: DFO-MAR-2017-17

Commented [JM1]: Add Nfd file number if using the document jointly

**Ecosystem Management – Assessment and Approval of  
Species at Risk Act (SARA) Section 73 Permit Application**

**1. APPLICANT INFORMATION**

Permit Renewal? ☐ Yes ☒ No

Permit Amendment? ☐ Yes ☒ No

Is this a multi-year permit application? ☐ Yes ☒ No

If so, what is the starting year and ending year:

Previous Permit Number(s): n/a

**Individual(s) or Organization to appear as the Licensee on the Permit**

Name: OCEARCH

Contact: George Christopher Fischer

Email: chris@oearch.org

Address: 1790 Bonanza Drive, Suite 101B

Park City, Utah, USA 84060

Phone: 435-645-8990

The following individuals and those under their direct supervision may undertake the activities authorized by the permit:

Name	Organization

**2. ACTIVITIES INFORMATION**

**a) Listed Species Affected:** White Shark (*Carcharodon carcharias*), Atlantic population - Endangered

**b) Project Summary:**

OCEARCH is proposing to conduct scientific research on White Sharks in Canadian waters to provide information in relation to a number of questions, including understanding the role of coastal waters off Nova Scotia and Newfoundland in the life history of the White Shark population, the range of the White Shark population in the northwest Atlantic, the health of White Sharks inhabiting Canadian waters, and adaptations of White Sharks for northwest Atlantic waters.

OCEARCH is proposing to conduct a research expedition in Canadian waters in September 2018, involving a collaborative team of scientists who will be onboard and collecting data to support a number of research projects. Sharks will be caught and guided to a research platform on the M/V OCEARCH. Research procedures (sampling and tagging) will be carried out on board the vessel, following which the animals will be released live. OCEARCH has requested a permit to tag 20 sharks in Canadian waters based on their analysis that 60 sharks are required for their various research studies (20 young-of-the-year, 20 immature and 20 mature); to date OCEARCH has tagged 33 sharks in the north Atlantic.

Actively attracting White Sharks to a vessel will be carried out by placing chum in the water using a variety of techniques. Observers on board the vessel scan for signs of White Shark activity and OCEARCH also makes use of drones [REDACTED] to search for White Sharks. To [REDACTED]

Canada

attract sharks, a combination of chum bags, chum boxes, bait tanks, chum tubes and decoys are used. The chum consists of whale blubber and oil, mackerel and tuna, and/or menhaden oil. OCEARCH will seek a marine mammal permit from DFO to authorize the use of marine mammal material in Canadian waters.

**White Sharks will be caught** using a circle hook (20/0 or 27/0 with zero offset). The hooks will be rigged with a crossbar bite-blocker (30cm up the leader) to prevent the shark from swallowing the bait. The hook will be attached to stainless steel wire rope (3/32" or 1/8"); the leader is about 10m and will be attached to a braid rope with elasticity properties to reduce hard shock when the initial struggle ensues. Typically within 5-10 minutes of being caught, the White Shark is guided onto the hydraulic lift.

**White Sharks will be lifted out of the water** on a hydraulic lift that is lowered off the research vessel. The lift, which includes side guides and an end gate to prevent the shark from swimming off, will be lowered below the waterline and the shark guided on. The lift will then be slowly raised above the water. Once on the lift, the hook will be removed from the shark's jaw. The shark will be on its side for the initial 5-7 minutes (to take blood samples, implant the acoustic tag, perform ultrasound) then it is rolled to an upright position (to attach satellite tag). Other procedures undertaken while the White Shark is on the lift will be the collection of swabs (skin mucus, gill surface and cloacal swabs); collection of parasites, collection of semen, fecal, and muscle samples, as well as possibly urine samples if the animal urinates while on deck, and the collection of eye/tail measurements.

**Blood and tissue sampling** will be conducted while White Shark are onboard the vessel. A hypodermic puncture and biopsy punch will be used to obtain blood (<25ml), muscle (<5g), semen, and skin mucus samples.

**Implantation of internal acoustic tags** will be conducted by making a surgical incision to insert a sterilized transmitter (1cm x 6cm) into the coelomic cavity. The incision will be sutured and the sutures will be absorbed over a period of time. OCEARCH is proposing to insert the internal acoustic tags in every White Shark (up to 20) caught in Canadian waters under this permit application.

**Attachment of satellite tags** will be conducted by drilling and bolting Smart Position or Temperature (SPOT) tags on the leading edge of the first dorsal fin. The SPOT tags (Wildlife Computers Model SPOT-257) measure 162 x 57 x 20 mm and weigh 160 g. To attach the tag, four holes are drilled in to dorsal fin with an electric drill (drill bit will be cleaned and sterilized in alcohol before use). The tag will be attached with alcohol-sterilized nylon bolts, stainless locknuts and plastic spacers (standard hardware from the tag manufacturer). Tags will be coated with an antifouling compound. The hardware is designed to retain the tag for five years, after which it will fail and the tag will detach.

**Commented [JM3]:**  
-need clarity on whether all three tag types will be attached to each individual.

OCEARCH is proposing to attach a SPOT tag to every White Shark (up to 20) caught in Canadian waters under this permit application.

Pop-up Satellite Archival Tags (PSAT) will be attached via a tether to a subdermal metal dart implanted in the shark's flank below the first dorsal fin.

PSAT tags are provided to OCEARCH by a collaborator at the Woods Hole Oceanographic Institution. The number of tags has not been confirmed, but will likely be 4-6 tags. The PSAT tags will be attached, in addition to acoustic and SPOT tags, on the largest 4-6 animals.

OCEARCH is also potentially looking to use a prototype ESA tag that is a combination of a PSAT and SPOT tag – see the following information:

*As for the new prototype ESA tag,*

*is attached via a darted tether in the same way as a PSAT.*

s.21(1)(b)

c) Analysis of Proposed Activities:

<b>SARA Listed Species:</b> White Shark White Shark ( <i>Carcharodon carcharias</i> ), Atlantic population - Endangered				
<b>Location:</b> Atlantic Ocean				
Coastal Nova Scotia:				
<ul style="list-style-type: none"> <li>Mahone Bay (44° 29.50' N / 64° 13.50' W and adjacent areas</li> <li>Bay of Fundy (44° 54.00' N / 66° 32.50' W and adjacent areas</li> </ul>				
South Coast of Newfoundland:				
<ul style="list-style-type: none"> <li>Placentia Bay (47° 05.00' N / 54° 32.00' W</li> </ul>				
Sable Island (43° 56.14' N / 59° 56.59' W)				
<b>Dates:</b> September 18-October 11, 2018				
Proposed Activity	Planned Effects/Outcome		Potential Incidental Effects/Outcome	
	Prohibitions that Apply	Likelihood of the prohibited impact(s)	Prohibitions that Apply	Likelihood of the prohibited impact(s)
Actively attracting White Sharks to a vessel (i.e., chumming)	Harass	Med	Harm	Low
Catch and release of White Sharks	Harass Harm Capture	Med Low High	Kill	Low
Lifting White Sharks out of the water	Harass Harm Capture Possess	Med Low High High	Kill	Low
Blood and tissue sampling	Harass Possess	Med High	Harm	Low
Implantation of internal acoustic tags	Harass Harm	Med Low	Kill	Low
Attachment of satellite tags -- SPOT tags	Harass Harm	Med Low	Kill	Low
Attachment of satellite tags -- PSAT tags	Harass Harm	Med Low	Kill	Low

**Commented [JM4]:** Defn of harass: Any activity or series of activities that disturb, alarm, or molest one or more individuals which by means of its frequency and magnitude could change its normal behaviour(s) thereby reducing an individual's ability to carry out one or more of its life processes.

**Commented [JM5]:** Defn of harm: The adverse result of an activity comprised of a single or multiple events reduce the fitness of individuals within a population.

**Commented [JM6]:** Would this be considered possession; it's short term?

**Commented [JM7]:** Review form for NBW biopsy sampling included Harass and Harm as planned effects; with the likelihood as Med for both.

Impacts to individual White Sharks would result from any distress associated with the approaching vessel, being caught and brought onboard the vessel and out of water, the application of the different tag types and collection of samples.

**Actively attracting White Sharks to a vessel (i.e., chumming)**

A number of studies suggest that the presence of chum may be linked to modification of White Sharks' normal swimming and/or hunting behaviours, although the effects are likely short term when chum is used

for short term research projects.<sup>1</sup> It is possible that attracting a White Shark will cause the individual to stray from patrolling for food or from mating.

disturbance to normal feeding behaviours may result in greater energetic costs.<sup>2</sup>

There is a possibility that attracting sharks to the research vessel may result in collisions between the shark and the vessel and that the presence of the vessel may cause behavioural changes.

#### **Catch of White Sharks**

Catch and release fishing is a source of stress to White Sharks due to the potential for long fight times (exhausting the individuals) and injury from wounds caused by the hooks. Long capture times have been known to kill bony fish and other sharks.<sup>3</sup>

Injury does result from the wound caused by the hook, although the extent of the tissue damage or injury will depend on the location of the hook and the type of gear. Sub-lethal injury can result from removing hooks or leaving them in place in the throat, esophagus or gut. In the short term, a hook in the mouth will cause a loss of blood, but the wound would be expected to heal within a year or less. Circle hooks are known to cause lower incidences of internal injury than conventional J hooks.<sup>4</sup>

Although not specific to White Shark, a study in Australia examined post release survival in Shortfin Mako by attracting individuals to a boat using chum, then using monofilament line and either J hooks or circle hooks to catch the sharks. The study showed that the length of the fight time did not impact survival. Circle hooks significantly reduced foul hooking. The study showed that hook choice affected the likelihood of mortality, while the species' is able to cope with long fight times and associated physiological responses to capture due to its endothermy and high aerobic scope.<sup>6</sup>

#### **Lifting White Sharks out of the water**

Lifting White Sharks out of the water, onto a hard raised platform, may create excessive pressure on tissues and organs that usually do not bear weight. This impact may be greater in larger individuals.

There are concerns about impacts/damage to internal organs; although no evidence is reported of internal organs being crushed when sharks are removed from the water.<sup>7</sup> However, if sharks are thrashing on the deck, this could lead to internal injuries.

OCEARCH has taken blood samples in the first minute and the last minute on the lift for 120 White Sharks handled in this manner and found stress levels remain relatively low throughout the handling time.

<sup>1</sup> NOAA. 2014. Draft Programmatic Environmental Assessment of Potential White Shark Research and Education Projects within the Gulf of the Farallones and Monterey Bay National Marine Sanctuaries. [https://nmssanctuaries.blob.core.windows.net/sanctuaries-prod/media/archive/library/pdfs/gfrms\\_draft\\_white\\_shark.pdf](https://nmssanctuaries.blob.core.windows.net/sanctuaries-prod/media/archive/library/pdfs/gfrms_draft_white_shark.pdf)

<sup>2</sup> Semmens, J.M., Payne, N.L., Huveneers, C., Sims, D.W. & Bruce, B.D. 2013. Feeding requirements of White Sharks may be higher than originally thought. Sci. Rep. 3, 1471; DOI:10.1038/srep01471 (2013).

<sup>3</sup> NOAA. 2014.

<sup>4</sup> NOAA. 2014.

<sup>5</sup> NOAA. 2014.

<sup>6</sup> French RP, Lyle J, Tracey S, Currie S, Semmens JM (2015) High survivorship after catch-and-release fishing suggests physiological resilience in the endothermic shortfin mako shark (*Isurus oxyrinchus*). Conserv Physiol 3: doi:10.1093/conphys/cov044.

<sup>7</sup> NOAA. 2014.



s.21(1)(b)

Higher amounts of stress due to capture were shown in very young White Sharks (young are not being proposed to be caught in Canadian waters).

#### Blood and tissue sampling

The *Canadian Council on Animal Care Guidelines on Care and Use of Fish in Research* suggest that blood samples be up to 1ml/kg body size. The volume proposed to be collected by this project is well under this recommended amount.

The retention of the blood and tissue samples involves possession of parts of individuals.

#### Implantation of internal acoustic tags

##### Attachment of satellite tags (SPOT and PSAT)

In terms of physical injury associated with the tagging, shark species in general are very resilient to superficial cuts and have a tremendous capacity to heal from injury.<sup>8</sup> Similar and much more extensive lacerations occur frequently during mating behaviours, and one of the identifying characteristics of a mature female shark is deep scarring along her dorsal musculature. The tagging site is expected to close over very quickly with minimal effect on the animal, as has been observed in other species held in captivity after tagging.

Various studies have examined possible longer term effects of electronic tags or data loggers on the swimming efficiency of sharks, but results have been variable.<sup>9</sup> There may be a marginally increased drag while swimming due to the external tag.

A recent study from South Africa suggests that SPOT tags can cause permanent cosmetic and structural damage to the dorsal fins of White Sharks, depending on how long the tag is attached for. Tags that detach within 12-24 months did not seem to cause long term damage; while after 24 months; permanent damage to the dorsal fin was reports. However, the study did not show that the damage to the dorsal fin resulted in impacts to long term survival or body growth.<sup>10</sup>

Research from Monterey Bay Aquarium also showed that real-time satellite tags attached with multiple bolts on juvenile White Sharks affects the growth of the dorsal fin (growing around the tag or causing a deflection to the tip of the fin). They suggested that there may be more of a reaction to the presence of the bolts and tag in growing tissue.<sup>11</sup>

OCEARCH has provided photographs of White Sharks observed years after tagging that show that the fins have healed and are functioning properly.

#### Long term effects

Research conducted off the west coast of California that involved tagging 21 White Sharks (2007-2012), found that they resumed 'normal' behaviours, as determined by their migration patterns. These sharks were tagged with SPOT tags (using various methodology including being lifted onto a platform out of the water and being tagged while alongside the research boat). As little is known about White Shark mating behaviour, it is unknown whether tagging could have an impact on mating.<sup>12</sup>

#### Summary

Based on the above assessment, the following activities have the potential to contravene the SARA prohibitions and therefore must be authorized under SARA:

<sup>8</sup> NOAA. 2014.

<sup>9</sup> Hammerschlag, N., et al., A review of shark satellite tagging studies, J. Exp. Mar. Biol. Ecol. (2011), doi:10.1016/j.jembe.2010.12.012

<sup>10</sup> Jewell QJD, Woisel MA, Gennari E, Townner AV, Bester MN, et al. (2011) Effects of Smart Position Only (SPOT) Tag Deployment on White Sharks *Carcharodon carcharias* in South Africa. PLoS ONE 6(11): e27242. doi:10.1371/journal.pone.0027242

<sup>11</sup> NOAA. 2014.

<sup>12</sup> NOAA. 2014.

- Actively attracting White Sharks to a vessel;
- Catching White Sharks and bringing them onboard a vessel;
- Attaching tags to White Sharks by *[include details]*; and
- Collecting biological samples from White Sharks by *[include details]*.

The effects that these activities may cause to White Sharks include:

- capture and harassment of individuals, and
- although unlikely, harm to, or killing of, individuals.

The Species at Risk Management Division has concluded that the activities associated with the above project are likely to affect the **White Shark, Atlantic population**, in a manner that is prohibited by SARA, and therefore a SARA Section 73 permit is considered necessary to engage in the proposed activities.

### 3. REGULATORY ASSESSMENT OF APPLICATION

#### **Necessity Assessment**

Work through the following five questions to determine the appropriate action for DFO to take in response to the permit application.

1. Is it likely that one or more species listed on Schedule 1 of the SARA occurs at any of the locations identified for the proposed activities?

☒ Yes ..... Go to next question

☐ No .....

**A SARA permit is not necessary. The applicant will be informed in writing and advised to ensure any other required authorizations are obtained before proceeding with the activities. Go to Assessment Summary.**

2. Are any of the SARA-listed species concerned considered an "Aquatic Species" as per the definition in the *Fisheries Act*?

☒ Yes ..... Go to next question

☐ No .....

**The applicant will be directed to resubmit the application to the appropriate agency. Go to Assessment Summary.**

3. Are the locations at which any of the activities are proposed to take place under the jurisdiction of Fisheries and Oceans Canada?

☒ Yes ..... Go to next question

☐ No .....

**The applicant will be directed to resubmit application to the appropriate agency. Go to Assessment Summary.**

4. Is it certain or likely that performing any of the proposed activities will affect the SARA-listed species concerned in a way to contravene the general prohibitions of SARA (subsections 32(1), 32(2), section 33, subsections 36(1), 58(1), 60(1) and 61(1))?

☒ Yes ..... Go to next question

☐ No .....

**A SARA permit is not necessary. The applicant will be advised of this in writing. Go to Assessment Summary.**

5. Do any of the exceptions listed in SARA Section 83 apply to the proposed activities concerned?

**Commented [JM8]:** s. 83(5d): Subsection 32(2) does not apply to a person who possesses an individual of a listed species or any part of an individual if the person acquired it by succession from someone who was entitled to possess it under this Act

-other review forms have listed all those that will receive/possess samples

☐ Yes .....  
A SARA permit is not necessary. The applicant will be advised of this in writing and the basis on which an exception applies will be described here. Go to Assessment Summary.

☒ No .....  
A SARA Section 73 permit is required to avoid contravention of the prohibitions of SARA. DFO will proceed with the application to assess eligibility. Go to Eligibility Assessment.

#### Eligibility Assessment

The following two questions assess whether the proposed activities are eligible for a SARA Section 73 permit.

**1. Section 73(2):** The purpose of the proposed activities is described by **one or more** of the following:

- ☒ The activity is scientific research relating to the conservation of SARA-listed species and will be conducted by qualified persons
- ☐ The activity benefits the species or is required to enhance its chance of survival in the wild.
- ☐ Affecting the SARA-listed species is incidental to carrying out the activity

The proposed activities aim to answer a number of research questions, both through the tracking of individual White Sharks that will be tagged and through analysis on blood and other tissue samples.

The draft Recovery Strategy for White Shark identifies the following as high priority research and management approaches:

- undertake scientific research to better understand population dynamics, distribution and habitat use.
- collect and maintain White Shark sightings information; maintain this information in a database and share via network

Qualified persons – expedition leader?

☒ Yes ..... Go to next question

☐ No .....  
The proposed activities are not eligible for a SARA Section 73 Permit. Go to Assessment Summary.

**2. Section 73(3):** The proposed activities meet **all** of the following pre-conditions:

- ☐ All reasonable alternatives to the activity that would reduce the impact on the species have been considered and the best solution has been adopted

In the consideration of alternatives to the proposed research, there are a number of alternatives that should be considered. The first alternative to consider would be to not undertake the activity and not conduct the research; however, given the many unknowns about the species this would not represent the best solution as it would be a loss of an opportunity to learn more.

There are no alternative locations to conduct the research, as it must be conducted within the range of the species.

In relation to the proposed activities, there are alternative methods that should be considered.

#### **Attracting and Catching White Shark**

- not using chum – this would limit the ability to sight White Sharks to passive observations; given the

low numbers in a large area, chance encounters would be low, which would reduce or even eliminate the success rate of researchers attempting to deploy tags or obtain biopsy samples.

#### Lifting out of the water

- employ a methodology to restrain White Sharks alongside a small vessel so that tagging and sampling takes place while the shark is completely submerged - it has been suggested that this may reduce stress experienced by the shark as a result of being lifted from the water; however, OCEARCH has indicated that sharks are more likely to struggle if they remain in the water, while being on the lift quiets the animals; therefore the proposed method reduces the potential for harm to the sharks.

#### Blood and tissue sampling

- collect biological samples by harpoon – while some types of samples could be collected this way, blood samples, swabs of the skin mucus, gill surface and cloacal, parasite collection and semen samples require catching and controlling the animal. Attempting to obtain these samples in the water increases the risk of sample contamination, loss of sample and infections in the shark.

#### Tagging

SPOT, PSAT and acoustic tags all do different things and collect different types of data.

SPOT tags transmit location and other data in real time. Information is transmitted while the tag is attached to the shark; the data signal from these tags is sent when the shark's dorsal fin is at the surface. SPOT tags may transmit data for up to 3-5 years. To obtain real-time geolocation data from an animal that is wide ranging within areas that are previously unknown, SPOT tags provide the best option for collecting this data.

Data from PSAT tags is stored on the device and retrieved after the tag detaches from the shark. PSAT tags will collect data for approximately one year. PSAT tags provide archived temperature and depth data, but the geolocation data is less precise and not available in real-time.

Acoustic tags are useful to detect the arrival of an animal in an area where underwater acoustic receivers have been deployed (typically well-studied inshore areas).

For early phases of understanding an animal's large scale movements and migration, such as is the case with White Sharks, SPOT tags are the most effective in revealing the precise tracks. OCEARCH has indicated that the data cannot be substituted with data from PSAT or acoustic tags.

- ☐ All feasible measures will be taken to minimize the impact of the activity on the species or its critical habitat or the residence of its individuals

The following measures were proposed by OCEARCH to minimize the impacts of the activities:

- individuals will not be chased by the vessel, will be attracted using chum
- gear will be used that will minimize the chance that animals are gut-hooked (circle hooks, crossbar bite-blocker)
- animal struggles and injury will be minimized through the methodology used to catch White Sharks
  - The leader is attached to a braid rope with elasticity properties to help reduce hard shock when the initial struggle ensues. A 10 m leader length is used in case the shark rolls in the line to ensure that the shark cannot bite through the rope and escape (retaining the hook/leader).

- Leaders will be embedded inside a three-strand rope to give it a thicker diameter if the shark rolls, as the thicker rope does not cut into the sharks' skin and is easier to unwrap.
  - The use of heavier tackle keeps enough pressure on the shark that the line is stretched tight and the shark cannot turn and roll.
- all research procedures will be conducted within 20 minutes
- while on the research platform:
  - oxygenated seawater will be pumped through a hose and mouthpiece into the shark's buccal cavity at all times while being restrained; the mouthpiece allows for simultaneous flushing of the gills on both sides of the head.
  - a tail rope will be used to prevent the animal from causing harm to itself and others;
  - the head and eyes will be covered with wet terrycloth towel to reduce animal stress and keep eyes moist;
  - the skin will be kept wet during in-air procedures to prevent drying
  - animal stress will be monitored by observing skin colouration, presence of blood pooling, gill movements, and animal activity; if stress is detected in the animal, a blood sample will be taken to evaluate the shark's conditions; if acute stress is observed, the animal will be released immediately.
- OCEARCH is currently seeking approval of their animal care plan from Jacksonville University and will notify DFO once that the approved plan is in place.

In addition, the permit will require:

☒ The activity will not jeopardize the survival or recovery of the species

Opportunistic tagging of White Sharks will not jeopardize the survival or recovery of the population. The recovery goal in the draft recovery strategy is to: "Maintain or increase the population of White Sharks that frequent Atlantic Canadian waters." No mortality is expected as a result of the activities, and therefore recovery will not be compromised. Even in the very unlikely event that mortality occurs during the activities, Science advice indicates that the population of White Sharks in the NW Atlantic is increasing and current mortality levels (due to incidental capture in fisheries) would have to increase substantially before population trajectories would be predicted to decline. Therefore there is a high likelihood that recovery goals can be achieved under various scenarios of allowable harm for White Shark, even if annual bycatch mortality increases from historical estimates.<sup>13</sup>

☐ Yes ..... **Go to Consultation Assessment**

☐ No ..... **The proposed activities are not eligible for a SARA Section 73 Permit. Go to Assessment Summary.**

### Consultation Assessment

The following two questions assess whether consultation with an outside party is required before issuing a SARA Section 73 Permit for the proposed activities:

1. **Section 73(4):** Do the proposed activities concern a species in an area in respect of which a wildlife management board is authorized by a land claims agreement to perform functions in respect of wildlife species?

☐ Yes ..... **Go to Assessment Summary**

<sup>13</sup> DFO. 2017. Evaluation of Scope for Harm for White Shark (*Carcharodon carcharias*) in Atlantic Canada. DFO Can. Sci. Adv. Sec. Sci. Resp. 2017/025.

☒ No ..... Go to next question

2. **Section 74(5):** Do the proposed activities concern a species in a reserve or any other lands that are set apart for the use and benefit of a band under the Indian Act?

☐ Yes ..... Go to Assessment Summary  
☒ No ..... Go to Assessment Summary

#### Assessment Summary

The above assessment is summarized below. In order to recommend that a SARA Section 73 Permit be issued for the proposed activities, the above assessment must demonstrate that doing so is warranted, lawful, and if applicable, that all consultation requirements of SARA s. 73(4) or 73(5) have been fulfilled. [highlight in red text the selected responses]

1. The proposed activities warrant the need for a SARA Section 73 Permit.

☒ Yes ..... Go to next question  
☐ No .....

**A SARA permit is not necessary. The applicant will be advised of this in writing. Go to EM Permit Decision.**

2. The proposed activities are consistent with all of the eligibility requirements of SARA Section 73.

☐ Yes ..... Go to next question  
☐ No .....

**The proposed activities are not eligible for a SARA s.73 Permit. Go to EM Permit Decision.**

3. The permit decision, proposed activities, and any permit contents require consultation with an outside party.

☐ Yes .....  
**Undergo consultation with the appropriate party before proceeding further in the permitting process.**

☒ No .....  
**Issue a SARA s.73 Permit. Go to Ecosystem Management Permit Decision.**

#### 4. REVIEW

Input sought from:

Name	DFO Sector

#### 5. ECOSYSTEM MANAGEMENT PERMIT DECISION

☐ **A SARA Section 73 Permit is not considered necessary to engage in the proposed activities.**

☐ **Issue SARA Section 73 Permit** subject to the conditions outlined in the SARA Section 73 Permit for DFO-MAR-20##-##.

☐ **Do not issue Section 73 Permit.**

**6. SIGN-OFF**

**Reviewed by:**

\_\_\_\_\_  
Donald Humphrey  
Regional Manager  
Species at Risk Management Division (Maritimes  
Region)

\_\_\_\_\_  
Date

\_\_\_\_\_  
Katrina Sullivan  
Regional Manager  
Species at Risk Management Division (Newfoundland  
and Labrador Region)

\_\_\_\_\_  
Date

The following measures were proposed by OCEARCH to minimize the impacts of the activities:

- individuals are not chased by the vessel, but are attracted using chum
- using gear that will minimize chance that animals are gut-hooked (circle hooks, crossbar bite-blocker)
- minimize animal struggles and injury
  - The leader is attached to a braid rope with elasticity properties to help reduce hard shock when the initial struggle ensues. A 10 m leader length is used in case the shark rolls in the line to ensure that the shark cannot bit through the rope and escape (retaining the hook/leader).
  - Leaders are often embedded inside a three-strand rope to give it a thicker diameter if the shark rolls, as the thicker rope does not cut into the sharks' skin and is easier to unwrap.
  - The use of heavier tackle keeps enough pressure on the shark that the line is stretched tight and the shark cannot turn and roll.
- all research procedures will be conducted within 20 minutes
- while on the research platform:
  - oxygenated seawater will be pumped through a hose and mouthpiece into the shark's buccal cavity at all times while being restrained. The mouthpiece allows for simultaneous flushing of the gills on both sides of the head.
  - a tail rope will be used to prevent the animal from causing harm to itself and others;
  - the head and eyes will be covered with wet terrycloth towel to reduce animal stress and keep eyes moist;
  - the skin will be kept wet during in-air procedures to prevent drying
  - animal stress will be monitored by observing skin colouration, presence of blood pooling, gill movements, and animal activity; if stress is detected in the animal, a blood sample will be taken to evaluate the shark's conditions; if acute stress is observed, the animal will be released immediately.

**Commented [JM1]:** Analysis from NOAA:  
The capture of sharks would involve a braided steel cable for a leader, which cannot be severed by their sharp teeth. While steel cable can be abrasive to shark skin during the capture process, at times causing raw wounds, the braided cable leader would be embedded into the center of nylon rope, which is soft and flexible and prevents the cable from coming into contact with the skin. Thus, the hybrid cable/nylon rope leader is a reasonable method to use on captured adult White Sharks while preventing the occurrence of raw abrasive wounds. The cable/rope hybrid is also easier and safer for researchers to handle while controlling the shark near the catch boat.

In addition, the permit could require:

Catch:

- size of the hook?
  - Report from NOAA req'd circle hooks to be 13 inches long by 7 inches wide with a 5 inch gap b/n the point and shank
- Hooks should not be barbed
- Hooks should be galvanized, not stainless steel, which would facilitate their deterioration and dropping from a shark in case the hook cannot be removed.

**Commented [JM2]:** Reviewer of the NOAA document indicated hooks should be smaller; rationale for this size was that sharks can straighten smaller hooks



Use of the platform:



Tags

- Number, placement, type

Requirements to cease work and contact DFO immediately:

- Shark is hooked in certain location (e.g. throat)?
- Any mortality/significant injury?

Observers on board?

**Pages 103 to / à 108  
are duplicates of  
sont des duplicatas des  
pages 118 to / à 123**



## NOTE TO FILE

FILE NUMBER - NUMÉRO DE DOSSIER

CALL IN		CALL OUT		SITE VISIT		NOTE		TIME HEURE	DATE (Y-A - M - D-J)
NAMES OF PERSON(S) CONTACTED NOM(S) DE LA (DES) PERSONNE(S) CONTACTÉE(S)									2018-02-06
Meeting with Heather Bowlby, Warren Joyce and Aimee Gromack									
SUBJECT - OBJET									
Discussion of OCEARCH permit application to tag white sharks									
SUMMARY - RESUME									
<p>We discussed various methodologies that are used worldwide to tag White Sharks (capturing and removing from the water, capturing and tagging while in the water or tagging free-swimming sharks); capturing the shark likely increases the success of tagging; this has to be balanced with the increasing amount of handling and potential for stress/longer term behavioral impacts.</p>									
<p>Before discussing exact conditions we would propose to OCEARCH, decided that a discussion of the alternatives, including potential impacts and type of data that can be collected, is needed. Jenn will prepare a table summarizing this information. Aimee and Jenn will discuss with team lead/manager in SARMD to determine next steps.</p>									
<p>In terms of mitigation, Warren advised that he reviewed the methodology proposed by OCEARCH (hook type, gear type, etc.) and would advise that this is sufficient mitigation.</p>									
CONCLUSION - CONCLUSIONS			ACTION TAKEN - SUITE DONNÉE			ACTION REQUIRED - SUITE À DONNER			
RECORDED BY ENREGISTRÉ PAR	NAME - NOM Jennifer MacDonald			DIVISION - DIVISION Species at Risk Management Division			TELEPHONE - TÉLÉPHONE 902-407-8175		

## MacDonald, Jennifer

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**From:** Joyce, Warren  
**Sent:** February-06-18 1:42 PM  
**To:** MacDonald, Jennifer; Bowlby, Heather  
**Cc:** Gromack, Aimee  
**Subject:** RE: White Shark tagging alternatives  
**Attachments:** OCEARCH\_Alternatives.docx

**Follow Up Flag:** Follow up  
**Flag Status:** Flagged

A couple notes you may want to include...

In regards to the “no capture” scenario, the only other sampling I could foresee would be a muscle sample or “tissue plug”. Generally, with a free swimming animal you might only have one shot which is typically used to attach a tag.

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**From:** MacDonald, Jennifer  
**Sent:** February-06-18 12:39 PM  
**To:** Bowlby, Heather; Joyce, Warren  
**Cc:** Gromack, Aimee  
**Subject:** White Shark tagging alternatives

Thanks for a good discussion this morning – I really appreciate all your insights.  
I put together the attached table to show, based on what we discussed this morning, the three basic tagging approaches (out of water, in water, no capture) and the types of tags that can be applied and samples collected. I think seeing it visually will help as we brief up here. Would you take a quick look and make sure this seems correct – I think I missed if any other samples can be collected in the ‘no capture’ scenario.

Thanks so much!

Jenn

### Jennifer MacDonald

Species at Risk Biologist | Biologiste des espèces en péril  
Species at Risk Management Division | Division de la gestion des espèces en péril  
Ecosystem Management | Gestion des écosystèmes  
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Email | Courriel: [jennifer.macdonald@dfo-mpo.gc.ca](mailto:jennifer.macdonald@dfo-mpo.gc.ca)

## OCEARCH Permit Application – Review of Alternatives

### Overview of Tags Types:

- SPOT tags transmit location data in near-real time; they may transmit data for up to 3-5 years; provide the most accurate geolocation data
- PSAT tags store data to be transmitted after the tag detaches; they will collect data for approx. 1 year; provide temperature and depth data (in addition to estimated geolocation data based on light levels)
- Acoustic tags detect presence of an animal in areas where underwater acoustic receivers have been deployed (typically well-studied inshore areas, some have the ability to transmit depth and/or temperature data as well)
- PSATs and acoustic tags can be deployed in tandem (fewer attachment points)

Tag Types	Capture and Use of Lift	Capture and Tag in Water		No Capture
		SPOT	PSAT	
Other Samples	PSAT Acoustic (internal or external)	PSAT Acoustic (external)	PSAT Acoustic (external)	
	<ul style="list-style-type: none"> <li>• blood samples</li> <li>• swabs (skin mucus, gill surface and cloacal swabs)</li> <li>• muscle samples</li> <li>• parasite samples</li> <li>• semen samples</li> <li>• fecal samples</li> <li>• urine samples (opportunistic)</li> <li>• eye/tail measurements</li> <li>• ultrasound</li> </ul>	<ul style="list-style-type: none"> <li>• blood samples</li> <li>• swabs (skin mucus)</li> <li>• muscle samples</li> </ul>	<ul style="list-style-type: none"> <li>• muscle sample</li> </ul>	

## MacDonald, Jennifer

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**Subject:** White Shark permitting  
**Location:** Collaboration Room

**Start:** Wed 14/02/2018 2:00 PM  
**End:** Wed 14/02/2018 3:00 PM  
**Show Time As:** Tentative

**Recurrence:** (none)

**Meeting Status:** Not yet responded

**Organizer:** MacDonald, Jennifer  
**Required Attendees:** Humphrey, Donald; Schaefer, Heidi; Hastings, Katherine; Gromack, Aimee

Hi all,

Aimee and I recently met with Science to gather some additional feedback on the White Shark permitting application. There were a number of interesting points raised, which we thought would be helpful to discuss as a group in order to determine some next steps. I am working on the much more detailed Assessment Form (detailing potential impacts, mitigation, etc.), but the attached document provides a brief outline of alternative methodologies that can be used for tagging, which will provide some context for the meeting.

Thanks,

Jenn



OCEARCH\_Alter...

# OCEARCH Permit Application – Overview of Alternative Methodologies

## OCEARCH Permit Application

OCEARCH is proposing to conduct a research expedition in Canadian waters in September 2018 in which sharks will be caught and guided to a research platform:

- Actively attracting White Sharks to a vessel by placing chum in the water using a variety of techniques; chum consists of whale blubber/oil, mackerel and tuna, and/or menhaden oil.
- White Sharks will be caught using a circle hook rigged with a crossbar bite-blocker to prevent the shark from swallowing the bait. The hook will be attached to stainless steel wire rope; the leader is about 10m and will be attached to a braid rope with elasticity properties to reduce hard shock when the initial struggle ensues. Typically within 5-10 minutes of being caught, the White Shark is guided onto the hydraulic lift.
- White Sharks will be lifted out of the water on a hydraulic lift that is lowered off the research vessel. Once on the lift, the hook will be removed from the shark's jaw.
- Blood and tissue sampling will be conducted while White Shark are onboard the vessel. A hypodermic puncture and biopsy punch will be used to obtain blood (<25ml), muscle (<5g), semen, and skin mucus samples.
- OCEARCH is proposing to use 3 distinct tags (internal acoustic and SPOT tags on all White Sharks caught (up to 20); PSAT tags on 4-6 sharks)
  - Implantation of internal acoustic tags will be conducted by making a surgical incision to insert a sterilized transmitter (1cm x 6cm) into the coelomic cavity. The incision will be sutured and the sutures will be absorbed over a period of time.
  - Attachment of satellite tags will be conducted by drilling and bolting SPOT tags on the leading edge of the first dorsal fin. The SPOT tags measure 162 x 57 x 20 mm and weigh 160 g. To attach the tag, four holes are drilled in the dorsal fin with an electric drill (drill bit will be cleaned and sterilized in alcohol before use). The tag will be attached with alcohol-sterilized nylon bolts, stainless locknuts and plastic spacers (standard hardware from the tag manufacturer). Tags will be coated with an antifouling compound. The hardware is designed to retain the tag for five years, after which it will fail and the tag will detach.
  - PSAT tags will be attached via a tether to a subdermal metal dart implanted in the shark's flank below the first dorsal fin. PSAT tags are provided to OCEARCH by a collaborator at the Woods Hole Oceanographic Institution.

### Overview of Tag Types:

- **SPOT tags** transmit location data in near real-time; they may transmit data for up to 3-5 years; provide the most accurate geolocation data
  - SPOT tags can be attached using 4 bolts or 1 bolt
- **PSAT tags** store data to be transmitted after the tag detaches; they will collect data for approx. 1 year; provide temperature and depth data (in addition to estimated geolocation data based on light levels)
- **Acoustic tags** detect presence of an animal in areas where underwater acoustic receivers have been deployed (typically well-studied inshore areas), some also transmit depth and/or temperature data
  - Acoustic tags can be inserted internally or attached externally
- PSATs and external acoustic tags can be deployed in tandem (fewer attachment points)
- Combined PSAT / SPOT tags are under development

### Types of Tagging/Sampling that can be Conducted Under Different Approaches

	<b>Capture and Use of Lift</b>	<b>Capture and Tag in Water</b>	<b>No Capture</b>
<b>Tag Types</b>	SPOT PSAT Acoustic (internal or external)	SPOT PSAT Acoustic (external)	PSAT Acoustic (external)
<b>Other Samples</b>	<ul style="list-style-type: none"><li>– blood samples</li><li>– swabs (skin mucus, gill surface and cloacal swabs)</li><li>– muscle samples</li><li>– parasite samples</li><li>– semen samples</li><li>– fecal samples</li><li>– urine samples (opportunistic)</li><li>– eye/tail measurements</li><li>– ultrasound</li></ul>	<ul style="list-style-type: none"><li>– blood samples</li><li>– swabs (skin mucus)</li><li>– muscle samples</li></ul>	<ul style="list-style-type: none"><li>– muscle samples</li></ul>

### Potential Concerns with Different Approaches

	<b>Capture and Use of Lift</b>	<b>Capture and Tag in Water</b>	<b>No Capture</b>
<b>Potential Concerns</b>	<ul style="list-style-type: none"><li>– injury from hooking</li><li>– stress from capture and removal from water</li><li>– potential for internal injury due to being on the lift</li><li>– short and/or long term behavioural impacts</li></ul>	<ul style="list-style-type: none"><li>– injury from hooking</li><li>– stress from capture</li><li>– short and/or long term behavioural impacts</li></ul>	<ul style="list-style-type: none"><li>– short and/or long term behavioural impacts</li></ul>

*\*note, there are also potential concerns/impacts associated with attaching tags and collecting samples; however the purpose of the above is to identify concerns with the broader methodologies*

### Other Factors for Consideration:

- capturing a shark may increase the success of tagging efforts
- increasing the amount of handling, may increase the potential for stress/longer term behavioral impacts



## MacDonald, Jennifer

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**From:** Gromack, Aimee  
**Sent:** February-15-18 2:01 PM  
**To:** MacDonald, Jennifer  
**Subject:** FW: Canadian White Shark Research

Hi Jenn,

I just found this in my inbox from awhile back. I didn't reply and I don't see any replies from Heather or Warren. Just thought I'd send it along for more context about the relationship issues between OCEARCH and other scientists.

Aimee

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**From:** [REDACTED]  
**Sent:** November-09-16 11:49 AM  
**To:** Joyce, Warren; Bowlby, Heather; Gromack, Aimee  
**Cc:** Skomal, Gregory (FWE)  
**Subject:** Canadian White Shark Research

Good Morning,

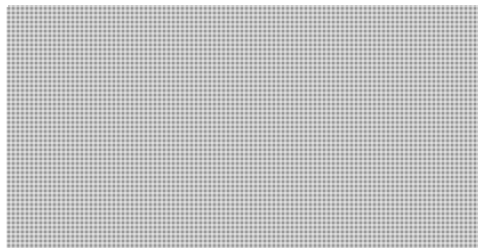
I'm sure you're all aware that a couple of the SPOT tagged white sharks are ping from Canadian waters and if you haven't seen it already, Chris Fischer is using the media to make a case to work in Canada: <http://atlantic.ctvnews.ca/researchers-wonder-if-great-whites-are-looking-for-love-off-sable-island-1.3151630>

<http://fijisharkdiving.blogspot.com/2013/04/fischer-reality-check-comments-by-dr.html>

I have a great interest in Canadian white sharks. I feel strongly that any white shark research in Canada should be and can be done by Canadian researchers

If you have any questions  about this don't hesitate to contact us.

Thanks,



## MacDonald, Jennifer

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**From:** Robert Hueter <rhuetter@mote.org>  
**Sent:** February-28-18 11:48 AM  
**To:** MacDonald, Jennifer  
**Cc:** Chris Fischer  
**Subject:** Re: Receipt of SARA Permit Application

**Follow Up Flag:** Follow up  
**Flag Status:** Completed

Hi Jenn:

Chris and I would like to know how things are going with our SARA permit application for OCEARCH. We'd like to propose a Skype or GoToMeeting call with you and any of your colleagues to get a sense of our chances, and to answer any remaining questions. Are you available for a call in the coming days/weeks?

Best regards,  
Bob

### **ROBERT E. HUETER, Ph.D.**

*Senior Scientist & Director, Center for Shark Research  
Perry W. Gilbert Chair in Shark Research  
Manager, Sharks & Rays Conservation Research Program  
Mote Marine Laboratory  
1600 Ken Thompson Parkway  
Sarasota, FL 34236 USA*

[rhuetter@mote.org](mailto:rhuetter@mote.org)  
Tel: 941-388-1827  
Fax: 941-388-4312  
More info at: [www.mote.org](http://www.mote.org)

On 2/5/2018 1:21 PM, MacDonald, Jennifer wrote:

Hello Bob,

Thank for the offer to meet with us; I will discuss that with my colleagues here and let you know if that would be helpful to our review of your permit application.

Also, as follow-up to our earlier correspondence about permitting requirements for using drones in Canada, you may wish to consult Transport Canada's website with respect to drones (<http://www.tc.gc.ca/eng/civilaviation/drone-safety.html>). I am not familiar with that process, but you may also require a permit from Transport Canada.

Regards,  
Jenn

**Jennifer MacDonald**  
Species at Risk Management Division  
(902) 407-8175

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**From:** Robert Hueter [<mailto:rhueter@mote.org>]  
**Sent:** February-05-18 8:56 AM  
**To:** MacDonald, Jennifer  
**Cc:** Chris Fischer; Sooley, Darrin; Bryan Franks; Fernanda Ubatuba; Ami Meite; Brandon; Brett McBride  
**Subject:** Re: Receipt of SARA Permit Application

That's great, Jenn, thank you. We are available at any time to provide further information and would be happy to travel to Nova Scotia to meet you and the SARA team, to discuss our expedition plans and invite DFO collaboration.

Bob Hueter

On Feb 5, 2018, at 7:41 AM, MacDonald, Jennifer <[Jennifer.MacDonald@dfo-mpo.gc.ca](mailto:Jennifer.MacDonald@dfo-mpo.gc.ca)> wrote:

Hello Bob,

Thank you so much for the additional information. Darrin and I have reviewed the information you provided and do not have any additional questions at this time. I've attached our official letter indicating that the permit review timelines have resumed. We will be in touch should we have any further questions or clarifications.

Thank you,  
Jenn

**Jennifer MacDonald**  
Species at Risk Management Division  
(902) 407-8175

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**From:** Robert Hueter [<mailto:rhueter@mote.org>]  
**Sent:** February-01-18 12:30 PM  
**To:** MacDonald, Jennifer  
**Cc:** Chris Fischer; Sooley, Darrin; Bryan Franks; Fernanda Ubatuba; Ami Meite; Brandon; Brett McBride  
**Subject:** Re: Receipt of SARA Permit Application

Hi Jenn:

I will attempt to answer your questions quickly, see below. I'm not on the ship right now so if Chris or other OCEARCH staff on this email have anything to add or change about what I write, they can chime in. If anything is unclear or you have further questions, please don't hesitate to email back.

Cheers,  
Bob

**ROBERT E. HUETER, Ph.D.**

*Senior Scientist & Director, Center for Shark Research  
Perry W. Gilbert Chair in Shark Research  
Manager, Sharks & Rays Conservation Research Program  
Mote Marine Laboratory  
1600 Ken Thompson Parkway  
Sarasota, FL 34236 USA*

[rhuetter@mote.org](mailto:rhuetter@mote.org)

Tel: 941-388-1827

Fax: 941-388-4312

More info at: [www.mote.org](http://www.mote.org)

On 2/1/2018 10:58 AM, MacDonald, Jennifer wrote:

Hello Bob,

Thank you so much for the additional information; the further details are very helpful in understanding the research that OCEARCH is proposing to conduct. I have a couple of small follow-up questions that I'm hoping you could clarify for me please?

On page 1 of the document, you indicate that you have used drones and spotter planes in the past to locate White Sharks; do you plan to use either or both in Canadian waters? You should be aware that there may be additional permit requirements for these activities.

I do not believe we have made any arrangements, or have any plans at this time, to use a spotter plane during the Atlantic Canada expedition. If that situation changes we will pursue the necessary additional permits. As for drones, we do usually carry a drone on the ship for spotting and filming purposes, flying it only in the vicinity of where we are working. Any advice you may have on necessary permitting for this would be appreciated.

With respect to the types of tags that will be used, could you confirm that you plan to attach all three tag types (PSAT, SPOT and acoustic tags) to each individual? If that is not the case, could you please indicate exactly which tag types will be used on which numbers of individuals. On page 6 of the document you attached, you provided information on a prototype of a new combined PSAT and SPOT tag; do you want us to evaluate the use of this tag type within your current permit application? If so, we will require the same types of details that you have provided for the other tag types (tag information, method of attachment, etc.).

Every white shark will get both a fin-mounted SPOT tag and internal acoustic tag. As for PSATs, those usually come from our collaborators at Woods Hole Oceanographic Institution (Dr. Simon Thorrold and students). At this time we do not know how many they will provide for the Atlantic Canada expedition, but typically they might give us about 4-6 tags to deploy. We would only put all three tag types on the largest 4-6 animals. The PSATs are attached via tether to a subdermal metal dart placed just below the first dorsal fin. As for the new prototype ESA tag, there is no formal name or model number for this tag yet as it is not commercially available. Tentatively they are calling the tag "PT Geyser" and it works off the SeaStar software by the tag company Star-Oddi in Iceland ([www.star-oddi.com](http://www.star-oddi.com)). It is similar in size and looks nearly identical to a Wildlife Computers MiniPAT PSAT (the type we deploy for WHOI) and is attached via a darted tether in the same way as a PSAT. We have four of these on the ship now, trying to get them out on white sharks in U.S. waters. I am guessing we might also have up to 4-6 of these to deploy in Atlantic Canada, if current testing goes well. If we do have ESA tags, we will not need the WHOI PSATs, as we will share all the ESA tag data with them. Thus, I predict a maximum of 4-6 of the largest white sharks would get three tags on them.

On page 3 of the document, you provide details on the research conducted while an individual White Shark is on the lift platform (while on its side and then when upright). The list of activities to be conducted includes "conduct other research procedures". In addition to the specific procedures named on this page of the document (blood samples, implantation of acoustic tag, ultrasound, and attachment of the satellite tags), other procedures that are mentioned in the original application and this supplementary document include collecting swabs (skin mucus, gill surface and cloacal swabs); collection of parasites, collection of semen and muscle samples and eye/tail measurements. Could you please confirm if there are other research procedures that will be conducted?

The only "other procedures" not specifically mentioned in this list are taking fecal samples from the cloaca and possibly urine samples if the animal happens to urinate while on deck. That has rarely happened but when it does we try to collect some of the expressed urine.

Thank you,  
Jenn

**Jennifer MacDonald**  
Species at Risk Management Division  
(902) 407-8175

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**From:** Robert Hueter [<mailto:rhuetter@mote.org>]  
**Sent:** January-31-18 5:21 PM

**To:** MacDonald, Jennifer  
**Cc:** Chris Fischer; Sooley, Darrin; Bryan Franks; Fernanda Ubatuba; Ami Meite; Brandon; Brett McBride  
**Subject:** Re: Receipt of SARA Permit Application

Dear Jenn:

Please accept the attached document we have prepared to address DFO's request for additional information on OCEARCH's SARA permit application.

We trust this document will provide the information needed to answer DFO's concerns about our proposed project in Atlantic Canada waters. If you have any further questions or needs for our application, please do not hesitate to contact us as soon as possible.

We are working on the other license applications that you kindly sent to us and will submit those shortly. Meanwhile, we look forward to DFO granting our SARA permit within 90 days so that we can proceed with our expedition planning.

Thanks very much, Jenn, for all your help guiding us through this process.

Best regards,  
Bob

**ROBERT E. HUETER, Ph.D.**

*Chief Science Advisor, OCEARCH  
Senior Scientist & Director, Center for Shark Research  
Perry W. Gilbert Chair in Shark Research  
Manager, Sharks & Rays Conservation Research Program  
Mote Marine Laboratory  
1600 Ken Thompson Parkway  
Sarasota, FL 34236 USA*

[rhuetter@mote.org](mailto:rhuetter@mote.org)

Tel: 941-388-1827

Fax: 941-388-4312

More info at: [www.mote.org](http://www.mote.org)

On 1/10/2018 9:44 AM, MacDonald, Jennifer wrote:

Hello Chris,

Thank you for your message. As indicated in our notification letter, under the regulations, you will receive a response to your permit application within 90 days from the date on the notification letter. There are instances where we are able to review and respond in less than 90 days, but I cannot guarantee that, especially at this time of year as we are currently receiving a number of permit applications for spring fieldwork.

We have conducted a preliminary review of your application and do have a number of questions or areas of the application for which we would like to request additional information. The attached document outlines a number of specific questions. As detailed in the attached letter, our 90 day review timeline will be suspended until we have received all the necessary information back from OCEARCH and we are able to resume our review.

Should you have any questions or would like clarification on any of the questions in the attached, please do not hesitate to get in touch.

Best regards,  
Jenn

**Jennifer MacDonald**  
Species at Risk Management Division  
(902) 407-8175

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**From:** Chris Fischer [<mailto:chris@oearch.org>]  
**Sent:** January-09-18 5:04 PM  
**To:** MacDonald, Jennifer  
**Cc:** Sooley, Darrin; Sullivan, Katrina; Humphrey, Donald; Bob Hueter; Bryan Franks; Fernanda Ubatuba; Ami Meite; Brandon  
**Subject:** Re: Receipt of SARA Permit Application

Jennifer,  
Thank you for your reply.  
Do you have any idea on the typical timeline for the review process?  
We will reach out to the other authorities and agencies mentioned in your email below. Thank you for this information.  
I am copying in several of our team members who are working on this process at oearch.  
If possible, please include them on all future correspondence so we can reply to any questions etc in a timely manner.  
We are grateful for your consideration and hope you have a great 2018.  
All the best,  
Chris

**CHRIS FISCHER** | Expedition Leader | Founding Chairman



**P: 435.645.8990 | F: 435.645.7077 |**  
**BE ENGAGED: OCEARCH.ORG**

<image001.jpg>

On Jan 8, 2018, at 11:25 AM, MacDonald, Jennifer  
<[Jennifer.MacDonald@dfo-mpo.gc.ca](mailto:Jennifer.MacDonald@dfo-mpo.gc.ca)> wrote:

Hello Mr. Fischer,

I have attached the official letter acknowledging receipt of your applications to Fisheries and Oceans Canada (Maritimes and Newfoundland and Labrador Regions) for a *Species at Risk Act* Permit. Your applications will be reviewed and a response informing you of the decision to issue or decline to issue a permit will be provided to you following this review.

Please note, it remains your (OCEARCH's) responsibility to meet other requirements of federal, provincial and municipal authorities and agencies, including, but not limited to, the following:

- Licence to Fish for Scientific, Experimental, Educational, Public Display or Aquatic Invasive Species Control Purposes: If the proposed activities include fishing for educational purposes, public display, scientific purposes or to control aquatic invasive species, applicants will require a licence pursuant to Section 52 of the *Fishery (General) Regulations*. The application forms for the respective DFO regions are attached. For more information in Maritimes Region, please contact [RegionalLicensing.XMAR@dfo-mpo.gc.ca](mailto:RegionalLicensing.XMAR@dfo-mpo.gc.ca) and in Newfoundland and Labrador Region, please contact [experimental.licenses@dfo-mpo.gc.ca](mailto:experimental.licenses@dfo-mpo.gc.ca);
- Foreign Fishing Vessel Licence;
- Permission from Parks Canada Agency regarding activities in proximity to Sable Island ([https://www.pc.gc.ca/apps/rps/page1\\_e.asp](https://www.pc.gc.ca/apps/rps/page1_e.asp)).

Should you have any questions, please contact me at the information below.

Regards,  
Jennifer

**Jennifer MacDonald**

Species at Risk Biologist | Biologiste des espèces en  
peril

Species at Risk Management Division | Division de la  
gestion des espèces en péril

Ecosystem Management | Gestion des écosystèmes  
Fisheries & Oceans Canada | Pêches & Océans Canada  
P.O. Box 1006 Dartmouth N.S. | C.P. 1006 Dartmouth  
N.E. B2Y 4A2

Tel | Tél: (902) 407-8175 Fax | Téléc: (902) 426-2331

Email | Courriel: [jennifer.macdonald@dfo-mpo.gc.ca](mailto:jennifer.macdonald@dfo-mpo.gc.ca)

<SARA-Application-Received-  
signed.pdf><Revised Section 52 Licence Request  
Form (October 2017).docx><APPLICATION FOR  
EXPERIMENTAL LICENCE.doc>

<SARA-Time-Resume\_2018-02-01\_Signed.pdf>

**MacDonald, Jennifer**

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**From:** Robert Hueter <rhuetter@mote.org>  
**Sent:** March-05-18 1:20 PM  
**To:** MacDonald, Jennifer  
**Cc:** Bowlby, Heather; Chris Fischer; [REDACTED] Danielle Pernette; Bryan Franks; Fernanda Ubatuba  
**Subject:** Further information on OCEARCH methodology  
**Attachments:** Methods comparison.pdf; OCEARCH SARA-Permit-Application-NOV 2017 FINAL .pdf; OCEARCH Responses to DFO questions for SARA permit.pdf  
  
**Follow Up Flag:** Follow up  
**Flag Status:** Completed  
  
**PATH SAPH NO:** 17-PMAR-00018

My apologies if this is a repeat message, I'm experiencing some problems with my computer and I'm not sure my first attempt went through --

Hi Jenn:

In conversations we've had with one of our Canadian NGO partners (Coastal Action), it was brought to our attention that questions are still being raised about the need for OCEARCH's methodology for studying large sharks. More specifically, that everything we are doing can be done with non-capture methods such as being used by the Division of Marine Fisheries in Massachusetts. Nothing could be further from the truth, and to illustrate that, I put together the attached table comparing the two types of methodologies for your information.

In reviewing our SARA permit application please keep in mind that NOAA has closely scrutinized all of OCEARCH's methods and has issued us federal permits for our work in U.S. waters.

I'm including copies of our application and our document providing further requested information, for the benefit of the others on this email.

We look forward to discussing our request with you soon, and we hope to work with any and all DFO scientists who wish to take advantage of the opportunities OCEARCH presents for studies of these large sharks in Canadian waters.

Best regards,

Bob

--

**ROBERT E. HUETER, Ph.D.**

Senior Scientist & Director, Center for Shark Research  
 Perry W. Gilbert Chair in Shark Research  
 Manager, Sharks & Rays Conservation Research Program  
 Mote Marine Laboratory  
 1600 Ken Thompson Parkway  
 Sarasota, FL 34236 USA

*Chief Science Advisor*  
**OCEARCH**

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More info at: [www.mote.org](http://www.mote.org)

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pages 1035 to / à 1036**

**Pages 129 to / à 137**

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## Application for a Species at Risk Permit Fisheries & Oceans Canada

### 1. Applicant Information

**Applicant(s) Name:** OCEARCH

**Contact name**  
(if applicable): George Christopher Fischer


**Address:**

Street: 1790 Bonanza Drive, Suite 101B

City: Park City

Province/State: Utah

Country: USA Postal Code/Zip: 84060

**Phone:** 4356458990 Cellular:  Fax:

**Email:** [chris@oceanarch.org](mailto:chris@oceanarch.org)

**Date of application:** November 30, 2017

### 2. Qualifications of the applicant(s)

OCEARCH ([www.oceanarch.org](http://www.oceanarch.org)) is a not-for-profit scientific research, education and public outreach organization based in the United States. George Christopher (Chris) Fischer is the Founding Chairman and Expedition Leader of OCEARCH. Mr. Fischer has led more than 30 global expeditions since 2007, to advance marine science and education, facilitating millions of dollars in collaborative ocean research on apex predators involving more than 160 scientists from more than 80 regional and international institutions (*see attached "List of Collaborating Scientists on OCEARCH Expeditions"*). The goals of OCEARCH are to enable scientists and governments around the world to generate critically needed, ground-breaking, open-sourced research data while providing dynamic STEM education for school children. OCEARCH has been mentioned in more than 10,000 news stories since 2012.

Research expeditions aboard the M/V OCEARCH, an at-sea marine laboratory, have been conducted globally including areas off South Africa, Australia, the Galapagos Islands, South America, Mexico, and the United States. The unique facilities and crew of M/V OCEARCH are especially suited for innovative conservation research on large marine species, particularly sharks. Since 2012, OCEARCH has been focused on advancing our understanding of the conservation biology of the white shark (*Carcharodon carcharias*) in the northwest Atlantic Ocean. Cutting-edge techniques are being used to examine movements and assess health of these animals, providing critical data for the protection of the Atlantic population of this highly vulnerable species, designated as Endangered by Fisheries and Oceans Canada and designated as Prohibited by NOAA in the United States. Tracking data from satellite-linked tags attached to this and other species are provided through open-access to the scientific community and the public, on OCEARCH's website and free smartphone app, the Global Shark Tracker. This near real-time dynamic tool allows researchers, students, and private citizens to track and learn about sharks along with expedition scientists.

OCEARCH has formal affiliations with many research and educational institutions, including Jacksonville University and Mote Marine Laboratory in Florida. JU serves as the home base for the M/V OCEARCH and the program's undergraduate educational activities. Mote's Dr. Robert Hueter, Senior Scientist and Director of the Center for Shark Research, serves as OCEARCH's Chief Science Advisor (CV attached).

☒ See attached curriculum vitae – Dr. Robert Hueter



<b>3. Preferred Language of Correspondence:</b> <input checked="" type="checkbox"/> English <input type="checkbox"/> French	
<b>4. Has the applicant received a SARA permit before?</b>  <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No  If yes, please provide the permit number(s):	
<b>5. Activity name:</b>	EXPEDITION ATLANTIC CANADA
<b>6. Listed Species affected</b> List species at risk that may be affected by the proposed activities (common and scientific names). <ul style="list-style-type: none"><li>• White shark (<i>Carcharodon carcharias</i>)</li></ul>	





**7. Purpose of the proposed activity(ies):**

Select the option that most closely describes the purpose of your activity:

- ☒ Scientific research relating to the conservation of the species
- ☐ Activity beneficial to the species or required to enhance its chance of survival in the wild
- ☐ Affecting the species is incidental to the carrying out of the activity

Indicate and explain if different purposes apply to different species at risk

(None)

- ☒ See attached document(s), page(s): "OCEARCH North Atlantic White Shark Research"



## 8. Description of proposed activity(ies)

Provide a description of the activity(ies), and if applicable, a description of the project of which the activity is a part. Include an explanation of why each activity fits the category identified in the previous question.

OCEARCH proposes to conduct scientific research on white sharks in Canadian waters to address the following suite of conservation questions: 1) What is the role of coastal waters off Nova Scotia and Newfoundland in the life history of the white shark population in the northwest Atlantic?; 2) What is the range of the northwest Atlantic white shark population and how are Canadian Atlantic waters connected with those of other territorial jurisdictions in this population's range?; 3) What is the overall health of white sharks inhabiting Canadian waters, and what threats exist to their health, survival, and reproductive success?; and 4) How are white sharks adapted for life in northwest Atlantic waters, and how might environmental change affect them in the future? In the 2011 amendment to the 2006 SARA Schedule 1 listing, which placed the white shark in the "endangered" category, the following qualifier was included: ***"The benefits of listing the White Shark in Canada are difficult to assess, since mortality in Canadian waters is considered to be a very small component of the threats to the species, and it is unknown to what extent recovery will be facilitated by listing."*** The only way to assess this is to conduct research that will provide ***"the necessary information and direction to make decisions and guide behaviour in relation to the conservation of listed aquatic species at risk and their critical habitat,"*** as called for in the 2016-2017 DFO Report on Plans and Priorities (RPP). Nonfatal, minimally invasive research on white shark health, ecology and behavior in Canadian waters, therefore, is critically needed to assess their current status for COSEWIC review.

To address this need, we propose to apply a research toolbox that OCEARCH has successfully used in other areas around the world. Our research techniques include: satellite-linked and acoustic tagging; blood, tissue, parasite and genetic sampling; morphometric measurements and photo-documentation; ultrasonography; and other advanced methodology. On each expedition, a collaborative team of approximately 20 leading scientists collects data for approximately 15 different projects (*see attached document "OCEARCH North Atlantic White Shark Research"*) using the facilities of OCEARCH. We propose to conduct OCEARCH's third expedition in 2018 in Canadian waters off the coasts of Nova Scotia and Newfoundland. [Note the attached document does not yet include Canadian collaborators who will be added as this permit application is being processed.] For these studies, sharks are caught and guided to a unique research platform on the M/V OCEARCH, which is anchored at sea within the animal's natural habitat. All research procedures are conducted within 15-20 minutes, after which the animals are released live and unharmed. Survivorship and post-release behavior are confirmed by satellite tracking data. This protocol has been applied successfully by OCEARCH on hundreds of sharks off the U.S. east and west coasts, Mexico, South Africa, Australia, the Galapagos, and South America. Results can be viewed on the open-access platform Global Shark Tracker ([www.ocearch.org](http://www.ocearch.org)) and with the free app for smartphone. Collaborating scientists process samples, analyze collected data, and disseminate their findings in a number of ways, including publication in peer-reviewed journals and presentations at local, national, and international meetings.

Our previous results from the northwest Atlantic along with other anecdotal data have suggested that critically important phases of the white shark life cycle – notably mating – may be taking place in Canadian Atlantic waters. We wish to confirm this through field research conducted in the months of September and October off Nova Scotia and southern Newfoundland. In addition to this primary conservation research component, OCEARCH also conducts education and public outreach to local communities in each research area. This outreach includes public presentations, events, ship tours, engagement with local, national, and international media, and social media activities. OCEARCH proposes to provide such educational content to interested stakeholder groups of Nova Scotia and Newfoundland. OCEARCH already is working with Green Schools of Nova Scotia to provide science content and interact directly with their students, a relationship with Canadian schools that will grow if OCEARCH is permitted to work in Canadian waters.

☒ See attached document(s), page(s): "OCEARCH North Atlantic White Shark Research"



**9a. Location of the proposed activity(ies):**

Provide a detailed description of the location of the activity(ies).

Indicate if the activity occurs in a land claim settlement area, on an Indian Reserve, or any other lands that are set apart for an Indian band.

If the activity will take place at sea, please indicate Fishery Management areas, and vessel, platform or aircraft information including photos, name and Commercial Fishing Vessel/Registration number, country of registration, and Foreign Vessel Clearance (if applicable).

COASTAL NOVA SCOTIA, including the following areas:

- MAHONE BAY 44° 29.50' N / 64° 13.50' W and adjacent areas
- BAY OF FUNDY 44° 54.00' N / 66° 32.50' W and adjacent areas

SOUTH COAST OF NEWFOUNDLAND, including:

- PLACENTIA BAY 47° 05.00' N / 54° 32.00' W

SABLE ISLAND 43° 56.14' N / 59° 56.59' W

M/V OCEARCH – US FLAGGED VESSEL – OFFICIAL NUMBER 967106

CONTENDER – TENDER TO OCEARCH – HULL ID JDJ28593C111

SAFE BOAT – TENDER TO OCEARCH – HULL ID EGO01581D111N1267

☒ See attached map and vessel photos and descriptions

**10. Date of proposed activity(ies):**

From (day, month, year)

To (day, month, year)

12 SEPTEMBER 2018

11 OCTOBER 2018

If applicable, describe the anticipated phases and their timelines:

(None)

☐ See attached document(s), page(s):



### 11. Effects of the proposed activity(ies) on the species

- a) Describe any changes that the activity may cause to the individuals of the species, and the effect of those changes. Include the nature of the effect, and the estimated number of individuals that may be affected. Describe the potential significance of those effects on the population as a whole. If multiple activities are part of the project, please provide this information for each activity.

Activity	Change	Effect	Significance
Catch and release	Short-term (<1 hr) interruption of shark's natural behavior	Short-term (<6 hr) alteration of shark's natural behavior post-release, followed by full recovery and resumption of natural behavior; up to approx. 20 animals	No permanent or chronic significance
Blood and tissue sampling	Hypodermic puncture and biopsy punch to obtain blood, muscle and other tissues	Removal of <25 ml blood, <5 g of muscle, semen sample (if mature male), skin mucus wipe; up to approx. 20 animals	No significance for animals sampled (large white sharks typically >500kg in body weight)
Implantation of internal acoustic tag	Surgical incision to insert sterilized transmitter approx. 1cm x 6cm into coelomic cavity, followed by suturing of incision	Small incision for healing; no effect of inert transmitter inside coelomic cavity; up to approx. 20 animals	None as shark skin and tissues heal rapidly and sutures are soon absorbed
Attachment of satellite tags	Drilling and bolting of SPOT satellite tag on first dorsal fin; implantation of tether anchor for PSAT tags	Initial tissue reaction to small wounds followed by healing and closure of incisions; some potential alteration of dorsal fin and scarring; up to approx. 20 animals	None as any effects do not alter animal's normal swimming and other biological functions

☒ See attached document(s), page(s): Photos of OCEARCH methods and animal handling



- b) If applicable, describe any changes that the proposed activity(ies) may cause to any residences of the individuals of the species, and the effect of those changes. Include the nature of the effect, and the estimated number of residences that may be affected. Describe the potential significance of those effects on the population as a whole. If multiple activities are part of the project, please provide this information for each activity.

Activity	Change	Effect	Significance
(None)			

- ☐ See attached document(s), page(s):

- c) Describe any anticipated changes to the habitat of the species at risk. Include the amount and type of habitat to be impacted, and the life processes of the species supported by that habitat. Please indicate any habitat that is identified as critical habitat in a recovery strategy or action plan for the species. Describe the potential significance of those impacts on individuals of the species at risk or the population as a whole. If multiple activities are part of the project, please provide this information for each activity.

Activity	Change	Effect	Significance
(None)			

- ☐ See attached document(s), page(s):



## 12. Alternatives Considered

Describe, in detail, all the alternatives to the proposed activity(ies) that were considered to avoid or reduce the impact on the species, including:

- other locations that have been considered that are outside of the species' range or outside of critical habitat, and why these locations were rejected in favour of the current location. If no other locations were considered, please provide your rationale.
- all alternative activities, technical or research designs, equipment or processes that were considered in order to achieve the outcomes of the proposed activity, and why these were rejected in favour of the proposed activity, design, equipment, or process (e.g., directional drilling instead of a stream crossing using trenching)
- other timelines that were considered that would avoid periods when the species are present or sensitive to disturbance and, why these were rejected in favour of the proposed timelines

This conservation research is being conducted on the listed species and thus must be done within the species' range on individuals of the species when those individuals are present. OCEARCH is conducting identical studies on this population of white sharks in other parts of its range, mainly off the U.S. east coast, but satellite tracking data and other anecdotal information suggest that the Canadian Atlantic is the site of critical aspects of white shark life history, which must be investigated for us to better understand the conservation implications.

Explain why the current proposal is the best solution. If multiple activities are part of the project, please describe alternatives that were considered for each activity.

The methods and procedures proposed here are the safest and most successful means of obtaining the necessary samples and attaching SPOT satellite tags to large white sharks. They have been employed, tested, and proven over more than a decade by the OCEARCH staff. The following necessary procedures can be done only by restraining and handling the sharks with facilities such as OCEARCH possesses: sampling of blood, semen, feces, and parasites; ultrasonography; implantation of internal acoustic tags; and attachment of fin-mounted SPOT tags. Alternative methods of attaching external acoustic and/or satellite tags will not produce the desired results, as external tags can be shed and floating SPOT tags can be fouled, shed, and lost from the animal very rapidly. Our results of obtaining reliable geolocations of animal movements over five years or more can only be obtained through the proposed methods.

☐ See attached document(s), page(s):



### **13. Measures to Minimize Impacts**

Describe all the measures that will be implemented to minimize the impact of the activity on the species, its habitat, or the residences of its individuals, including:

- a description of specific mitigation measures used to minimize impacts to the species (e.g., fish/mussel salvage, sediment and erosion control etc.) and the extent to which the measures have been demonstrated to be effective
- specific contingency measures in the event that the mitigation measures fail
- use of appropriate personnel to conduct the activities (e.g., the applicant has qualifications from a recognized institution, has demonstrated experience with the species, and/or has demonstrated experience with the proposed methodology)

If multiple activities are part of the project, please describe measures that will be implemented to minimize the impact of the activity on the species for each activity.

The following measures will be used to minimize the impacts on the animals during this research:

- Directed, targeted fishing on sighted animals with gear that will assure animals are restrained by the jaw, will prevent gut-hooking, and will minimize animal struggles and time to the research vessel
- Use of hydraulic lift that causes animal to relax and not struggle underwater so that sampling and tagging can be accomplished in the least possible time under the safest conditions
- Supply of oxygenated seawater via a hose and mouthpiece to the animal's gills at all times while being restrained
- Application of tail rope to prevent animal from causing harm to itself and others
- Covering of head and eyes with wet terrycloth towel to reduce animal stress and keep eyes moist
- Wetting of skin during in-air procedures to prevent drying

Animal stress will be monitored by observing skin coloration and animal activity. First blood samples will be examined for physiological signs of stress; if acute stress such as lactic acidosis is observed, the animal will be released immediately. A timekeeper will inform the scientific team of the shark's time on the lift and will call for the shark's release within no more than 20 minutes on the lift.

The OCEARCH expedition team comprises Ph.D. scientists who are experts with decades of experience in shark biology together with certified and trained veterinarians with advanced expertise in shark handling and husbandry. The fishing crew is deeply experienced in locating, catching, handling and releasing large white sharks, having successfully conducted such procedures for more than a decade in a number of locations around the world.

☐ See attached document(s), page(s):



#### **14. Monitoring:**

Describe how you will monitor the effects of your activity on the species. This includes monitoring the effectiveness of measures to minimize impacts to the species to determine whether the implementation of the measures achieved the intended outcomes.

While the shark is being handled and sampled aboard the M/V OCEARCH, physical condition (skin coloration, responses to touch, etc.) will be monitored and first blood samples will be examined for any sign of acute stress. Following release, the shark's movements will be monitored via attached satellite tags and acoustic transmitters. Post-release behavior will be assessed by analyzing shark movements as revealed on the Global Shark Tracker ([www.ocearch.org](http://www.ocearch.org) and free smartphone app), a public, open-access data platform, and through any encounters by acoustic receivers within the animal's range. All white sharks tagged in this study will, therefore, be visible for monitoring any signs of deleterious effects both during and after capture-and-release.

☐ See attached monitoring plan

#### **15. Describe, to your best understanding, why the proposed activity(ies) will not jeopardize the survival or recovery of the species.**

Recent studies (e.g. Curtis et al. 2014) have demonstrated apparent increases in abundance of white sharks in the northwest Atlantic. Sampling and tagging of approx. 20 individuals of a population that likely comprises several thousand and is increasing in number will not jeopardize the survival and continued recovery of this species. Since 2012, OCEARCH has completed seven expeditions in the northwest Atlantic, targeting white sharks with 33 successful captures, sampling, tagging and releases. Of those, 25 sharks (20 young-of-the-year, 3 subadults, 2 adults) had complete health assessments and biological sampling. Of the 33 sharks tagged with SPOT satellite-linked tags, 32 are transmitting data, indicating a survivorship of at least 97%. This indicates that application of these methods in Canadian Atlantic waters will not jeopardize the survival or recovery of the white shark population or species in the northwest Atlantic.

☐ See attached document(s), page(s):





## 16. Offsetting measures

Will you be proposing offsetting measures to counterbalance residual adverse impacts that remain after implementing all reasonable alternatives to avoid impacts and all feasible measures to minimize impacts to the species?

☐ Yes ☒ No-other than those stated in this application to mitigate any adverse effects

Does your offsetting plan comply with the requirements outlined in section 16 of this Application Guide?

☐ Yes ☐ No

Have you discussed your offsetting plan with DFO?

☐ Yes ☐ No

If yes to any of the above, please attach your offsetting plan to the application.

☐ See attached offsetting plan

  
Applicant's signature

11/30/17

Date

The information you provide on this form is collected under the authority of the *Species at Risk Act* (SARA) for the purpose of applying for a SARA permit. The information will be used for processing the SARA permit. In addition, the information may be used by DFO's Fisheries Officers for the purpose of compliance and enforcement with SARA. Failure to provide this personal information may result in your request being denied. You have the right to the correction of, access to, and protection of, your personal information under the Privacy Act and to file a complaint with the Privacy Commissioner of Canada over DFO's handling of your information. Personal information collected through the processing of your application is described in SARA Permits Personal Information Bank DFO PPU 770 and can be accessed and assessed for accuracy. For more information, visit Info Source at [www.infosource.gc.ca](http://www.infosource.gc.ca).



Fisheries and Oceans  
Canada

Pêches et Océans  
Canada

**Please send your completed application to the Regional Manager, Species at Risk Program at the relevant DFO Regional office:**

<p><b>Pacific Region</b> (British Columbia, Yukon Territory, excluding the North Slope which is within Central and Arctic Region)</p> <p>Fisheries and Oceans Canada 200-401 Burrard Street Vancouver, BC V6C 3S4 Tel: (604) 666-7907 E-mail: <a href="mailto:sara@pac.dfo-mpo.gc.ca">sara@pac.dfo-mpo.gc.ca</a></p>	<p><b>Central &amp; Arctic Region</b> (Northwest Territories, Nunavut, Alberta, Saskatchewan, Manitoba, Ontario, Yukon North Slope):</p> <p>Fisheries and Oceans Canada Freshwater Institute 501 University Cr Winnipeg, MB R3T 2N6 Tel: (204) 983-4438 E-mail: <a href="mailto:fisheriesprotection@dfo-mpo.gc.ca">fisheriesprotection@dfo-mpo.gc.ca</a></p>
<p><b>Quebec Region</b> (Quebec, St. Lawrence River, Northern Gulf of St. Lawrence):</p> <p>Fisheries and Oceans Canada 850 Route de la Mer C.P. 1000 Mont-Joli, Québec G5H 3Z4 Tel: (418) 775-0763 E-mail: <a href="mailto:lep-sara-qc@dfo-mpo.gc.ca">lep-sara-qc@dfo-mpo.gc.ca</a></p>	<p><b>Gulf Region</b> (Maritime Provinces adjacent to the Gulf of St. Lawrence):</p> <p>Fisheries and Oceans Canada P.O. Box 5030 343 Ave. Université Moncton, N.B., E1C 9B6 Tel: (506) 851-6253 Email: <a href="mailto:GLF-SARA-LEP@dfo-mpo.gc.ca">GLF-SARA-LEP@dfo-mpo.gc.ca</a></p>
<p><b>Maritimes Region</b> (from the northern tip of Cape Breton to the New Brunswick-Maine border):</p> <p>Bedford Institute of Oceanography P.O. Box 1006 1 Challenger Drive Dartmouth, NS B2Y 4A2 Tel: (902) 426-8503 E-mail: <a href="mailto:XMARSARA@mar.dfo-mpo.gc.ca">XMARSARA@mar.dfo-mpo.gc.ca</a></p>	<p><b>Newfoundland/Labrador Region</b> (Newfoundland, Labrador):</p> <p>Northwest Atlantic Fisheries Centre East White Hills Rd P.O. Box 5667 St. John's, NFLD A1C 5X1 Tel: (709) 772-4088 E-mail: <a href="mailto:SARANL-LEPTNL@dfo-mpo.gc.ca">SARANL-LEPTNL@dfo-mpo.gc.ca</a></p>

# LIST OF COLLABORATING SCIENTISTS ON OCEARCH EXPEDITIONS

LAST NAME	FIRST NAME	DEGREE	INSTITUTION	COUNTRY
			James Cook University	Australia
			Universidad Catolica del Norte	Chile
			Charles Darwin Foundation	Ecuador
			Cape Canaveral Scientific	United States
			Cape Canaveral Scientific	United States
			Texas A&M University CC / HRI / FAU	United States
			Universidade Federal Rural de Pernambuco	Brazil
			Georgia Aquarium	United States
			University of North Florida	United States
			Stellenbosch University	South Africa
			University of Tasmania	Australia
			James Cook University	Australia
			Georgia Southern University	United States
Belcher	Carolyn		GA Department of Natural Resources	United States
			Universidade Federal Rural de Pernambuco	Brazil
			University of Queensland	Australia
			Middle Tennessee State University	United States
			University of Massachusetts	United States
			University of Pretoria	South Africa
			University of Western Australia	Australia
			Rhodes University	South Africa
			Universidade Federal Rural de Pernambuco	Brazil
			Woods Hole Oceanographic Institution	United States
			Auburn University	United States
			Ampath Laboratories	South Africa
			Wildlife Conservation Society / NY Aquarium	United States
			Universidade Federal Rural de Pernambuco	Brazil
			Universidade Federal Rural de Pernambuco	Brazil
Chisholm	John		MA Division of Marine Fisheries	United States

			NC Aquarium at Fort Fisher	United States
			Audubon Aquarium	United States
			KwaZulu-Natal Sharks Board	South Africa
			University of South Carolina - Beaufort	United States
			South African Institute of Aquatic Biology	South Africa
			Seaworld	United States
			New Jersey Institute of Technology	United States
			Oceans Society	
Curtis	Tobey		NOAA Fisheries	United States
			DAFF	South Africa
			Rhodes University	South Africa
			Texas A&M University	United States
			Oceans Research	South Africa
			Bayworld	South Africa
			University of Limpopo	South Africa
			University of Delaware	United States
			Marine Conservation Science Institute	United States
			NC Aquarium on Roanoke Island	United States
			University of South Alabama, Dauphin Sea Lab / Mississippi State University	United States
			Bayworld	South Africa
			KwaZulu-Natal Sharks Board, DAFF	South Africa
			University of Massachusetts-Dartmouth	United States
			University of North Florida	United States
			Galapagos National Park Service	Ecuador
			NC Aquarium at Knoll Shores	United States
			Oceans Research	South Africa
			Universidade Federal Rural de Pernambuco	Brazil
			Fundacao de Ensino Superior de Olinda	Brazil
			University of Western Australia	Australia
			Adventure Aquarium	United States
			University of Windsor	Canada

			James Cook University	Australia
			New Jersey Institute of Technology	United States
Frazier	Bryan	M.S.	SC Dept. of Natural Resources	United States
			Universidade Federal Rural de Pernambuco	Brazil
			University of North Florida	United States
			Rhodes University, Oceans Research	South Africa
			University of South Carolina - Beaufort	United States
			Oceana (Chile)	Chile
			Oceans IQ	Australia
			University of Cape Town	South Africa
			Queensland University	Australia
			Woods Hole Oceanographic Institution	United States
			Adventure Aquarium	United States
			University of North Florida	United States
			Universidade Federal Rural de Pernambuco	Brazil
			UC Davis/ University of California	United States
			Florida International University	United States
			University of Cape Town	South Africa
			Florida Aquarium	United States
			UNC Wilmington	United States
			Queensland University	Australia
			Georgia Aquarium	United States
Hueter	Robert	Ph.D.	Mote Marine Laboratory	United States
Hussey	Nigel	Ph.D.	University of Windsor	South Africa
			Adventure Aquarium	United States
			University of Cape Town	South Africa
			University of Pretoria, Murdoch University (now)	South Africa
			North Carolina Aquarium at Fort Fisher	United States
			University of Pretoria	South Africa
			Oceans Research	South Africa

			UC Davis / University of California	United States
			Adventure Aquarium	United States
			University of Cape Town	South Africa
Koen	Pieter	Ph.D.	State Veterinary Services	South Africa
			Pontificia Universidad Catolica de Chile	Chile
			Wildlife Conservation Society / NY Aquarium	United States
			Universidad Austral de Chile	Chile
			Oceana (Chile)	Chile
			Universidade Federal Rural de Pernambuco	Brazil
			NC Aquarium at Fort Fisher	United States
			University of Massachusetts-Dartmouth / Mote Marine Laboratory	United States
			Stellenbosch University	South Africa
			Harbor Branch Oceanographic Institute at Florida Atlantic University	United States
			South African Shark Conservancy	South Africa
			Texas A&M University	United States
			Murdoch University	Australia
			University of North West, QuintilesIMS	South Africa
			Florida Aquarium	United States
			Virginia Aquarium and Marine Science Center	United States
Medders	Paul		GA Department of Natural Resources	United States
			Australian Institute of Marine Science	Australia
			University of Western Australia	Australia
			Southampton High School / Long Island Shark Collaboration	United States
			Oceana (Chile)	Chile
			University of North Florida	United States
			University of South Florida	United States
			University of North Florida	United States
			Oceana (Chile)	Chile
			College of Charleston	United States
			Wildlife Conservation Soc./NY Aq.	United States

			Aberdeen University	South Africa
			Florida International University	United States
			Universidade Federal Rural de Pernambuco	Brazil
			UC Davis / University of California	United States
			Stony Brook University	United States
			National Institute of Polar Research	Japan
			Universidade Federal Rural de Pernambuco	Brazil
			Pontifical Catholic University of Ecuador	Ecuador
			SEZARC	United States
			Universidad Austral de Chile	Chile
			Virginia Institute of Marine Science	United States
			Florida Fish and Wildlife	United States
			University of South Carolina - Beaufort	United States
			Florida Atlantic University	United States
			Charles Darwin Foundation	Ecuador
			University of Pretoria	South Africa
			University of Tasmania	Australia
			University of North Florida	United States
			Universidade Federal Rural de Pernambuco	Brazil
Skomal	Greg	Ph.D.	MA Division of Marine Fisheries	United States
			Bayworld	South Africa
			Turtle Island Restoration Network	Ecuador
			Texas A&M University CC / HRI	United States
			University of Western Australia	Australia
			Woods Hole Oceanographic Institution	United States
			Australian Institute of Marine Science	Australia
			Texas A&M University at Galveston	United States
			University of Cape Town	South Africa
			Universidade Federal Rural de Pernambuco	Brazil
			Universidade Federal Rural de Pernambuco	Brazil

	Universidad Catolica del Norte	Chile
	Universidade Federal Rural de Pernambuco	Brazil
	Wildlife Conservation Society / NY Aquarium	United States
	National Institute of Polar Research	Australia
	University of Cape Town	South Africa
	Texas A&M University at Galveston	United States
	North Carolina State University	United States
	Mote Marine Laboratory	United States
	Queensland University	Australia
	New Jersey Institute of Technology	United States
	KwaZulu-Natal Sharks Board	South Africa
	Federal University of Parana	Brazil
	Southeast Zoological Alliance for Reproductive Conservation	United States
	University of North Florida	United States



## ROBERT E. HUETER, Ph.D.

**Mote Marine Laboratory**  
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Fax 941-388-4312  
[rhuetter@mote.org](mailto:rhuetter@mote.org)



### Education

Ph.D. (Zoology)	University of Florida, 1988
M.S. (Marine Biology)	University of Miami, Rosenstiel School of Marine and Atmospheric Science, 1980
B.S. (Biology)	University of Miami, 1974

### Professional Positions

<b>1992-Present</b>	<b>Director, Center for Shark Research, Mote Marine Laboratory</b> <i>Supervises research, educational and outreach projects, fundraising, national and international collaborations and other broad-scale activities. The CSR is the nation's only Congressionally designated center dedicated to shark research, established in 1991. CSR multidisciplinary research program includes field and laboratory studies of genetics, anatomy, physiology, life history, behavior, ecology, population biology, fisheries science, marine policy, biomedical research and environmental studies. Coordinator of the National Shark Research Consortium (2001-2010), a partnership of four major marine science institutions conducting shark research.</i>
<b>1994-Present</b>	<b>Senior Scientist &amp; Manager, Shark and Rays Conservation Biology Program, Mote Marine Laboratory</b> <i>Marine researcher with more than 180 total publications. Project leader on &gt;\$18 million in grants. Responsible for proposal writing, project and staff management, research project design, data collection and analysis, and report and publication writing.</i>
<b>2001-Present</b>	<b>Perry W. Gilbert Chair in Shark Research, Mote Marine Laboratory</b> <i>One of only two eminent scholar chairs in residence at Mote Marine Laboratory.</i>
<b>2012-2016</b>	<b>Associate Vice President for Research, Directorate of Marine Biology &amp; Conservation, Mote Marine Laboratory</b> <i>Oversaw and advised 14 research programs at Mote Marine Laboratory including research on sharks, rays, sea turtles, marine mammals, corals, benthic ecology, microbiology, behavioral ecology and physiology, and ocean acidification.</i>
1990-92	Staff Scientist & Manager, Shark Biology Program, Mote Marine Laboratory
1988-90	Postdoctoral Scientist, Mote Marine Laboratory
1984-85	Research Assistant, Whitney Marine Lab, University of Florida
1980-81/83	Assistant Manager, Ichthyology, Florida State Museum, University of Florida
1975-78/82	Chief Scientist, R/V <i>Geronimo</i> , St. George's School, Newport RI
1981	AAAS Mass Media Science Fellow, National Public Radio, San Francisco CA
1980-81	Consultant, NOAA Recreational Fishery Survey, Human Sciences Research, McLean VA
1980	Research Assistant, Department of Zoology, University of Florida
1977-79	Editorial Researcher, International Oceanographic Foundation, Miami FL
1973/74	Research Technician, Virginia Institute of Marine Science, Gloucester VA
1972	Research Technician, Chesapeake Biological Laboratory, Solomons MD

## **Selected Appointments, Committees, Societies & Awards**

- Chief Science Advisor, OCEARCH (2017-)
- Affiliate Research Scientist, Dept. of Biol. Scis., Florida Atlantic University, Boca Raton FL (2011-2016)
- Courtesy Professor, Department of Biology, University of South Florida, Tampa FL (1998-2007)
- Highly Migratory Species Advisory Panel, NOAA/NMFS (1997-2018)
- SEDAR Advisory Panel, NOAA/NMFS (2013-2022)
- Special Shark Scientific and Statistical Committee, Gulf of Mexico Fishery Mgmt. Council (1991-2007)
- Shark Specialist Group, International Union for the Conservation of Nature (1998-2002, 2007-)
- American Elasmobranch Society: President (1993); Board of Directors (1991-98, 2014-); Chair, Gruber Award Committee (2000-06); Conservation Committee (1992-2002); Gruber Award (1988)
- Conservation and Research Advisory Committee, Florida Aquarium (2002-)
- IACUC, Lemur Conservation Foundation, Myakka City FL (2004-07)
- Vice President, Gum Slough Preservation Foundation (2006-)
- Economic Development Corp. of Sarasota County: Board of Directors (2004-2010); Secretary (2006)
- Economic Development Foundation of Sarasota County: Board of Directors (2011-2015)
- Lifetime Achievement Award in Conservation, Sarasota County FL (2007)
- Don Roehr Memorial Conservation Award, Sarasota Sportfishing Anglers Club (2014)
- Eugenie Clark Scientific Explorers Award (2008)
- Advisory Board, Shark-Free Marina Initiative (2009-)
- Scientific Director, Guy Harvey Ultimate Shark Challenge (2009-12)
- Conservation and Science Advisory Panel, Save Our Seas Foundation (2010-2011)

## **Teaching Experience**

2007	Biology of Sharks and Marine Mammals, Isla Mujeres, Mexico
1995/97/98	Biological Explorations of Sharks and Rays, Florida Keys/Bahamas
1996	JASON Project VII, Florida Keys
1986-87	Marine Biology, Department of Zoology, University of Florida
1986-87	Comparative Vertebrate Histology, Department of Zoology, University of Florida
1983-84	Laboratory in Biological Sciences, Department of Zoology, University of Florida
1981-82/84/86	Cells, Organisms and Genetics, University of Florida
1980/83	Molecular and Cellular Biology, Department of Zoology, University of Florida
1979	Elements of Biological Oceanography, University of Miami/RSMAS
1979	Non-Living Resources of the Oceans, University of Miami/RSMAS
1978	Biology of Marine Vertebrates, Museum of Science, Miami FL
1976/78	Biostatistics in Marine Science, University of Miami/RSMAS
1975-78/82	Shark Biology, R/V <i>Geronimo</i> , St. George's School, Newport RI

## **Postgraduate Student Training**

Supervisor, 6 Postdoctoral Scientists, Center for Shark Research, Mote Marine Laboratory.

Ph.D./M.S. Student Co-Supervisor or Advisor: University of South Florida (18 students); University of Central Florida (1); Florida Atlantic University (1); Nova Southeastern University (1); University of Waterloo (1); Clemson University (1); Southern Illinois University (1); University of North Carolina at Greensboro (1); Boston University (1); University of Kiel, Germany (1); University of Stockholm, Sweden (1); Edith Cowan University, Australia (1); University of Florida (1); University of Havana (1).

### **Selected Public Outreach Activities**

- Hundreds of media interviews for broadcast and print including CNN, NBC, CBS, ABC, PBS, MSNBC, FOXNews, Discovery Channel, National Geographic TV, NY Times TV, National Public Radio, Time Magazine, Life Magazine, NY Times, Washington Post, Smithsonian Magazine, Natural History, and Florida media outlets including all major television and radio stations and newspapers in the Tampa Bay region. Instrumental in full-length television (Discovery, National Geographic, PBS), radio (NPR), and museum (American Museum of Natural History) programs on sharks.
- Numerous public lectures in all forums from small school groups to large public auditoriums. Chief Scientist for Oearch shark research expeditions to: Boca Grande, Florida; Cape Cod, Massachusetts (2); and Jacksonville, Florida. Live television co-host researcher for 1996 JASON Project, a marine educational expedition in the Florida Keys. Many other distance-learning and internet-based educational programs.
- Conceptualization, technical consultation and development of "Shark Attack Theater," a multimedia and object gallery program with Science North of Ontario, Canada; program exhibited at Columbus Center, Baltimore, Maryland and at Mote Aquarium, Sarasota, Florida.
- Expert consultant to the Georgia Aquarium, Atlantis Aquarium (Nassau and Dubai), Florida Aquarium, National Aquarium in Baltimore and Monterey Bay Aquarium on shark biology, research and exhibit design; consultant to shark dive industry. Consultant in legal cases involving sharks and rays.
- Director of the Gulf Coast Shark Census (1989-98) and science coordinator of Guy Harvey Ultimate Shark Challenge (2010-12), two innovative recreational fishing tournaments designed to promote science-based catch-and-release fishing practices among shark fishermen. Internationally recognized advocate for shark conservation and sustainable marine resource management. Conservation leader in the southwest Florida community. Named by *Florida Trend* magazine as one of Florida's most influential people in 2004.

### **Selected Publications, Manuscripts, Reports and Abstracts (>180 total pubs.)**

2017. Hueter, R.E., J.P. Tyminski, F. Pina Amargos, J.J. Morris, A. Ruiz Abierno, J.A. Angulo Valdes and N. Lopez Fernandez. Movements of the silky shark (*Carcharhinus falciformis*) as tracked by satellite-linked tags off the Caribbean coast of Cuba. *Bulletin of Marine Science* (in review).
2017. Norman, B. et al. (38 authors incl. R. Hueter). Biology of an endangered marine megavertebrate further informed through citizen science. *BioScience* 67:1029-1043.
2017. Cerutti-Pereyra, F., K. Bassos-Hull, X. Arvizu-Torres, K.A. Wilkinson, I. García-Carrillo, J.C. Perez-Jimenez, and R.E. Hueter. Observations of spotted eagle rays (*Aetobatus narinari*) in the Mexican Caribbean using photo-ID. *Environmental Biology of Fishes*.  
<https://doi.org/10.1007/s10641-017-0694-y>
2017. Whitney, N.M., C.F. White, P.A. Anderson, R.E. Hueter and G.B. Skomal. The physiological stress response, postrelease behavior, and mortality of blacktip sharks (*Carcharhinus limbatus*) caught on circle and J-hooks in the Florida recreational fishery. *Fishery Bulletin* 115:532–543.
2017. Shiffman, D.S. and R.E. Hueter. A United States shark fin ban would undermine sustainable shark fisheries. *Marine Policy* 85:138-140.

2017. Smith, M., D. Warmolts, D. Thoney **R. Hueter**, M. Murray and J. Ezcurra (eds.). *The Elasmobranch Husbandry Manual II: Recent Advances in the Care of Sharks, Rays and their Relatives*. Special Publ., Ohio Biological Survey:xi+482pp.
2017. Bennett, R., S. Kaiser, R. Selvan, **R. Hueter**, J. Tyminski and P. Lotter. The rescue, rehabilitation and release of a whale shark (*Rhincodon typus*) in the Arabian Gulf. In Smith, M., D. Warmolts, D. Thoney R. Hueter, M. Murray and J. Ezcurra (eds.). *The Elasmobranch Husbandry Manual II: Recent Advances in the Care of Sharks, Rays and their Relatives*. Special Publ., Ohio Biological Survey:229-235.
2017. Gardiner, J.M., J. Atema, **R.E. Hueter** and P.J. Motta. Modulation of shark prey capture kinematics in response to sensory deprivation. *Zoology* 120C:42-52.
2017. Lear, K.O., N.M. Whitney, L.R. Brewster, J.J. Morris, **R.E. Hueter** and A.C. Gleiss. Correlations of metabolic rate and body acceleration in three species of coastal sharks under contrasting temperature regimes. *Journal of Experimental Biology* 220:397-407.
2017. **Hueter, R.E.**, J.P. Tyminski, J.J. Morris, A. Ruiz Abierno and J. Angulo Valdes. Horizontal and vertical movements of satellite-tagged longfin makos (*Isurus paucus* Guitart Manday, 1966) in the northwestern Atlantic Ocean. *Fishery Bulletin* 115:101-116. <https://doi.org/10.7755/FB.115.1.9>
2016. Flowers, K.I., M.J. Ajemian, K. Bassos-Hull, K.A. Feldheim, **R.E. Hueter**, Y.P. Papastamatiou and D.D. Chapman. A review of batoid philopatry, with implications for future research and population management. *Marine Ecology Progress Series* 562:251-261.
2016. Whitney, N.M., C.F. White, A.C. Gleiss, G.D. Schwieterman, P. Anderson, **R.E. Hueter** and G.B. Skomal. A novel method for determining post-release mortality, behavior, and recovery period using acceleration data loggers. *Fisheries Research* 183:210-221.
2015. Tyminski, J.P., R. de la Parra-Venegas, J. Gonzalez Cano and **R.E. Hueter**. Vertical movements and patterns in diving behavior of whale sharks as revealed by pop-up satellite tags in the eastern Gulf of Mexico. *PLoS ONE* 10(11):e0142156. doi:10.1371/journal.pone.0142156.
2015. Gardiner, J.M., N.M. Whitney and **R.E. Hueter**. Smells like home: the role of olfactory cues in the homing behavior of blacktip sharks, *Carcharhinus limbatus*. *Integrative and Comparative Biology* doi:10.1093/icb/icc087.
2015. Mara, K.R., P.J. Motta, A.P. Martin and **R.E. Hueter**. Constructional morphology within the head of hammerhead sharks (Sphyrnidae). *Journal of Morphology* 276:526-539, DOI: 10.1002/jmor.20362.
2015. Sellas, A.B., K. Bassos-Hull, J.C. Perez-Jimenez, J.A. Angulo-Valdes, M.A. Bernal and **R.E. Hueter**. Population structure and seasonal migration of the spotted eagle ray, *Aetobatus narinari*. *Journal of Heredity* doi: 10.1093/jhered/esv011.
2014. Chapman, D.D., K. Feldheim, Y. Papastamatiou and **R.E. Hueter**. There and back again: a review of residency and return migrations in sharks, with implications for population structure and management. *Annual Review of Marine Science* 7:547-570.
2014. Hsu, H.H., S.J. Joung, **R.E. Hueter** and K.M. Liu. Age and growth of the whale shark *Rhincodon typus* in the north-western Pacific. *Marine and Freshwater Research* DOI 10.1071/MF13330.

2014. Lang, A.W., M.T. Bradshaw, J.A. Smith, J.N. Wheelus, P.J. Motta, M.L. Habegger and **R.E. Hueter**. Movable shark scales act as a passive dynamic micro-roughness to control flow separation. *Bioinspiration & Biomimetics* 9:036017(10pp), DOI 10.1088/1748-3182/9/3/036017.
2014. Clingham, E., J. Brown, A. Dove, J. Tyminski and **R. Hueter**. Observations and first tagging of whale sharks off St. Helena in the south Atlantic. 30<sup>th</sup> Annual Meeting of the American Elasmobranch Society / Joint Meeting of Ichthyologists & Herpetologists, Chattanooga, Tennessee.
2014. Bassos-Hull, K., K.A. Wilkinson, P.T. Hull, D.A. Dougherty, K.L. Omori, L.E. Ailloud, J.J. Morris and **R.E. Hueter**. Life history and seasonal occurrence of the spotted eagle ray, *Aetobatus narinari*, in the eastern Gulf of Mexico. *Environmental Biology of Fishes* 97:1039–1056.
2014. Aguilar, C., G. González-Sansón, **R. Hueter**, E. Rojas, Y. Cabrera, A. Briones, R. Borroto, A. Hernández and P. Baker. Captura de tiburones en la región noroccidental de Cuba. *Latin American Journal of Aquatic Research* 42:477–487.
2014. Gardiner, J.M., J. Atema, **R.E. Hueter** and P.J. Motta. Multisensory integration and behavioral plasticity in sharks from different ecological niches. *PLoS ONE* 9(4):e93036.
2013. **Hueter, R.E.**, J.P. Tyminski and R. de la Parra. Movements and demographics of whale sharks in the Gulf of Mexico and northwestern Caribbean Sea. 3<sup>rd</sup> International Whale Shark Conference, Atlanta, Georgia.
2013. Tyminski, J.P., **R.E. Hueter** and R. de la Parra. Vertical movements and patterns in diving behavior of whale sharks identified through pop-up satellite tagging off the Yucatan Peninsula, Mexico. 3<sup>rd</sup> International Whale Shark Conference, Atlanta, Georgia.
2013. **Hueter, R.E.**, J.P. Tyminski and S. Kaiser. Movement of a satellite-tagged whale shark in the Arabian Gulf after rescue and rehabilitation in captivity. 3<sup>rd</sup> International Whale Shark Conference, Atlanta, Georgia.
2013. **Hueter, R.E.**, J.P. Tyminski and L. Villanueva. Issues and options for whale shark conservation in Gulf of Mexico and western Caribbean waters of the U.S., Mexico and Cuba. 3<sup>rd</sup> International Whale Shark Conference, Atlanta, Georgia.
2013. Bedore, C.N., E.R. Loew, T.M. Frank, **R.E. Hueter**, D.M. McComb and S.M. Kajiura. A physiological analysis of color vision in batoid elasmobranchs. *Journal of Comparative Physiology A* 199:1129–1141.
2013. **Hueter, R.E.**, J.P. Tyminski and R. de la Parra. Horizontal movements, migration patterns, and population structure of whale sharks in the Gulf of Mexico and northwestern Caribbean Sea. *PLoS ONE* 8(8):e71883.
2013. Gardiner, J.M., J. Atema, **R.E. Hueter** and P.J. Motta. Sensory switching in sharks: the role of multimodal stimuli in prey tracking and capture. *Integrative and Comparative Biology* 53:E74.
2013. Neff, C. and **R. Hueter**. Science, policy, and the public discourse of shark “attack”: a proposal for reclassifying human-shark interactions. *Journal of Environmental Studies and Sciences* 3(1):65–73. DOI 10.1007/s13412-013-0107-2:9pp.
2013. **Hueter, R.**, J. Tyminski, J. Morris and C. Aguilar Betancourt. Horizontal and vertical movements of a satellite-tagged longfin mako (*Isurus paucus* Guitart Manday, 1966) in the northwestern

Atlantic Ocean. 29<sup>th</sup> Annual Meeting of the American Elasmobranch Society / Joint Meeting of Ichthyologists & Herpetologists, Albuquerque, New Mexico.

2013. Winkler, M., T. Yuen, G. Shoa, K. Svoboda, C.J. Murphy, **R.E. Hueter**, D.J. Brown, J.V. Jester. Collagen macrostructure and corneal shape: lessons from divergent species. *Investigative Ophthalmology & Visual Science* 54(6):e1641.
2012. **Hueter, R.E.** and J.P. Tyminski. Issues and options for whale shark conservation in Gulf of Mexico and western Caribbean waters of the U.S., Mexico and Cuba. *Mote Marine Laboratory Tech. Rpt.* 1633:43pp.
2012. Lang, A., P. Motta, M.L. Habegger and **R. Hueter**. Shark skin boundary layer control. In: Childress et al. (eds) *Natural Locomotion in Fluids and on Surfaces* IMA 155, DOI 10.1007/978-1-4614-3997-4 9. Springer Science+Business Media, New York.
2012. Motta, P., M.L. Habegger, A. Lang, **R. Hueter** and J. Davis. Scale morphology and flexibility in the shortfin mako *Isurus oxyrinchus* and the blacktip shark *Carcharhinus limbatus*. *Journal of Morphology* 273:1096-1110.
2012. G. Machlis, T.A. Frankovich, P.M. Alcolado, E. Garcia-Machado, A.C. Hernández-Zanuy, **R.E. Hueter**, N. Knowlton, E. Perera, and J.W. Tunnell. US-Cuba scientific collaboration: emerging issues and opportunities in marine and related environmental sciences. *Oceanography* 25:227–231.
2012. Gardiner, J.M., **R.E. Hueter**, K.P. Maruska, J.A. Sisneros, B.M. Casper, D.A. Mann and L.S. Demski. Sensory physiology and behavior of elasmobranchs. In: Carrier, J.C., Musick, J.A., and Heithaus, M.R. (eds) *Biology of Sharks and Their Relatives*, 2nd Edition:349-401. CRC Press, Boca Raton, FL.
2012. **Hueter, B.** Whale shark aggregation areas. In *Beyond the Horizon: A Forum to Discuss a Potential Network of Special Ocean Places to Strengthen the Ecology and Culture of the Gulf of Mexico* (K.B. Ritchie and W.E. Kiene, eds), p 40–41. Proceedings: May 11–13, 2011, Mote Marine Lab, Sarasota FL. ([http://issuu.com/lawsonmitchell/docs/bth\\_forum\\_proceedings\\_final/3](http://issuu.com/lawsonmitchell/docs/bth_forum_proceedings_final/3))
2011. Lang, A., P. Motta, M.L. Habegger, **R.E. Hueter** and F. Afroz. Shark skin separation control mechanisms. *Marine Technology Society Journal* 45:208-215.
2011. Sellas, A.B., K. Bassos-Hull, **R.E. Hueter** and K.A. Feldheim. Isolation and characterization of polymorphic microsatellite markers from the spotted eagle ray (*Aetobatus narinari*). *Conservation Genetics Resources* 3:609–611.
2011. De la Parra, R., **R. Hueter**, J. Gonzalez-Cano, J. Tyminski, J.G. Remolina, M. Maslanka, A. Ormos, L. Weigt, B. Carlson and A. Dove. An unprecedented aggregation of whale sharks, *Rhincodon typus*, in Mexican coastal waters of the Caribbean Sea. *PLOS ONE* 6:e18994 (8pp.)
2010. Motta, P.J., M. Maslanka, **R.E. Hueter**, R.L. Davis, R. de la Parra, S.L. Mulvany, M.L. Habegger, J.A. Strother, K.R. Mara, J.M. Gardiner, J.P. Tyminski and L.D. Zeigler. Feeding anatomy, filter-feeding rate, and diet of whale sharks *Rhincodon typus* during surface ram-filter feeding off the Yucatan Peninsula, Mexico. *Zoology* 113:199-212.
2010. McComb, D.M., T.M. Frank, **R.E. Hueter** and S. M. Kajiura. Temporal resolution and spectral sensitivity of the visual system of three coastal shark species from different light environments. *Physiological and Biochemical Zoology* 83:299-307.

2009. Bizzarro, J.J., W.D. Smith, J. Leonardo Castillo-Geniz, A. Ocampo-Torres, J. Fernando Marquez-Farias and **R.E. Hueter**. The seasonal importance of small coastal sharks and rays in the artisanal elasmobranch fishery of Sinaloa, Mexico. *Pan-American Journal of Aquatic Sciences* 4(4): 513-531.
2009. Bizzarro, J.J., W.D. Smith, **R.E. Hueter** and C.J. Villavicencio-Garayzar. Activities and catch composition of artisanal elasmobranch fishing sites on the eastern coast of Baja California Sur, Mexico. *Bulletin of the Southern California Academy of Sciences* 108:137-151.
2009. Bizzarro, J.J., Smith, W.D., Marquez-Farias, J. Tyminski and **R.E. Hueter**. Temporal variation in the artisanal elasmobranch fishery of Sonora, Mexico. *Fisheries Research* 97:103-117.
2008. **Hueter, R.**, J. Tyminski and R. de la Parra. Deep diving and distant travels: vertical and horizontal movements of whale sharks (*Rhincodon typus*) tagged off Quintana Roo, Mexico. 24<sup>th</sup> Annual Meeting of the American Elasmobranch Society / Joint Meeting of Ichthyologists & Herpetologists, Montreal, Quebec, Canada.
2008. **Hueter, R.**, J. Tyminski and R. de la Parra. The geographical movements of whale sharks tagged with pop-up archival satellite tags off Quintana Roo, Mexico. Proc. of 2<sup>nd</sup> International Whale Shark Conference, Holbox, Quintana Roo, Mexico, 15-20 July 2008.
2008. Tyminski, J., **R. Hueter** and R. de la Parra. The vertical movements of whale sharks tagged with pop-up archival satellite tags off Quintana Roo, Mexico. Proc. of 2<sup>nd</sup> International Whale Shark Conference, Holbox, Quintana Roo, Mexico, 15-20 July 2008.
2008. Motta, P.J., **R.E. Hueter**, T.C. Tricas, A.P. Summers, D.R. Huber, D. Lowry, K.R. Mara, M.P. Matott, L.B. Whitenack and A.P. Wintzer. Functional morphology of the feeding apparatus, feeding constraints, and suction performance in the nurse shark *Ginglymostoma cirratum*. *Journal of Morphology* 269:1041-1055.
2008. **Hueter, R.E.**, and C.A. Simpfendorfer. Trends in blue shark abundance in the western North Atlantic as determined by a fishery-independent survey. *In Sharks of the Open Ocean: Biology, Fisheries and Conservation* (M.D. Camhi, E.K. Pikitch and E.A. Babcock, eds.). Blackwell Science Publ., Fish and Aquatic Resources Series 13:236-241.
2007. **Hueter, R.**, G. Cailliet, J. Musick, G. Burgess, J. Tyminski, D. Ebert, D. Grubbs and C. Conrath. Highly migratory shark fisheries research by the National Shark Research Consortium, 2002-2007. Mote Marine Laboratory Technical Report No. 1241:122p.
2007. Castro, A.L.F., B.S. Stewart, S.G. Wilson, **R.E. Hueter**, M.G. Meekan, P.J. Motta, B.W. Bowen and S.A. Karl. Population genetic structure of earth's largest fish, the whale shark (*Rhincodon typus*). *Molecular Ecology* 16:5183-5192.
2007. **Hueter, R.**, J. González-Cano, R. de la Parra, J. Tyminski, J. Perez-Ramírez and F. Remolina-Suarez. Biological studies of large feeding aggregations of whale sharks (*Rhincodon typus*) in the southern Gulf of Mexico. *In The First International Whale Shark Conference: Promoting International Collaboration in Whale Shark Conservation, Science and Management* (T.R. Irvine and J.K. Keesing, eds.). CSIRO Marine and Atmospheric Research, Australia, p 76.
2007. **Hueter, R.E.**, J.P. Tyminski, C. Simpfendorfer, R. de la Parra and M. Trigo-Mendoza. Satellite-based tracking of whale sharks (*Rhincodon typus*) tagged off Quintana Roo, Mexico: movement patterns, hypotheses and challenges. 23<sup>rd</sup> Annual Meeting of the American Elasmobranch Society / Joint Meeting of Ichthyologists & Herpetologists, St. Louis, Missouri.

2007. Heithaus, M.R., D. Burkholder, **R.E. Hueter**, L.I. Heithaus, H.L. Pratt, Jr. and J.C. Carrier. Spatial and temporal variation in shark communities of the lower Florida Keys and evidence for historical population declines. *Canadian Journal of Fisheries and Aquatic Sciences* 64:1302-1313.
2007. **Hueter, R.E.**, J.L. Castillo-Géniz, J.F. Márquez-Farias and J.P. Tyminski. The use of Laguna Yalahau, Quintana Roo, Mexico as a primary nursery for the blacktip shark. In *Shark Nursery Grounds of the Gulf of Mexico and the East Coast Waters of the United States* (C.T. McCandless, N.E. Kohler and H.L. Pratt, Jr., eds.). *American Fisheries Society Symposium* 50:345-364.
2007. **Hueter, R.E.** and J.P. Tyminski. Species-specific distribution and habitat characteristics of shark nurseries in Gulf of Mexico waters off peninsular Florida and Texas. In *Shark Nursery Grounds of the Gulf of Mexico and the East Coast Waters of the United States* (C.T. McCandless, N.E. Kohler and H.L. Pratt, Jr., eds.). *American Fisheries Society Symposium* 50:193-223.
2007. Tyminski, J.P., **R.E. Hueter** and A.J. Ubeda. Tag-recapture results of small coastal sharks *Carcharhinus acronotus*, *C. isodon*, *Rhizoprionodon terraenovae*, and *Sphyrna tiburo*) in the Gulf of Mexico. SEDAR 13-DW-36.
2007. Tyminski, J.P., A.J. Ubeda, **R.E. Hueter** and J. Morris. Relative abundance of blacknose sharks, *Carcharhinus acronotus*, from coastal shark surveys in the eastern Gulf of Mexico, 2001–2006. SEDAR 13-DW-37-V2.
2007. Ubeda A.J., J.P. Tyminski and **R. E. Hueter**. Relative abundance of bonnethead, *Sphyrna tiburo*, and Atlantic sharpnose sharks, *Rhizoprionodon terraenovae*, in two Florida Gulf estuaries, 1995-2004. SEDAR 13-DW-38-V2.
2007. Bizzarro, J.J. W.D. Smith, **R.E. Hueter**, J.Tyminski, J.F. Marquez-Farias, J.L. Castillo-Geniz, G.M. Cailliet and C.J. Villavicencio-Garayzar. The status of shark and ray fishery resources in the Gulf of California: applied research to improve management and conservation. Moss Landing Marine Laboratories Tech. Pub. 2009-01:238 pp.
2007. Bizzarro, J.J., W.D. Smith, J.F. Marquez-Farias and **R.E. Hueter**. Artisanal fisheries and reproductive biology of the golden cownose ray, *Rhinoptera steindachneri* Evermann and Jenkins, 1891, in the northern Mexican Pacific. *Fisheries Research* 84:137-146.
2007. Collins, A.B., M.R. Heupel, **R.E. Hueter** and P.J. Motta. Hard prey specialists or opportunistic generalists? An examination of the diet of the cownose ray, *Rhinoptera bonasus*. *Marine and Freshwater Research* 58:135-144.
2007. Lowry, D., P.J. Motta and **R.E. Hueter**. The ontogeny of feeding behavior and cranial morphology in the leopard shark *Triakis semifasciata* (Girard 1854): a longitudinal perspective. *Journal of Experimental Marine Biology and Ecology* 341:153-167.
2006. Sasko, D.E., M.N. Dean, P.J. Motta and **R.E. Hueter**. Prey capture behavior and kinematics of the Atlantic cownose ray, *Rhinoptera bonasus*. *Zoology* 109:171-181.
2006. **Hueter, R.E.**, C.A. Manire, J.P. Tyminski, J.M. Hoenig and D.A. Hepworth. Assessing mortality of released or discarded fish using a logistic model of relative survival derived from tagging data. *Transactions of the American Fisheries Society* 135:500-508.
2006. **Hueter, R.**, R. de la Parra, J. Tyminski, M. Trigo Mendoza, C. Simpfendorfer, J. Gonzalez Cano, F. Remolina Suarez and J. Perez Ramirez. Biological studies of the whale shark aggregation off Isla Holbox and Isla Contoy, where the Gulf of Mexico meets the Caribbean Sea. 59th Annual Gulf and Caribbean Fisheries Institute, Belize City, Belize:89-90.



2005. Matott, M.P., P.J. Motta and **R.E. Hueter**. Modulation in feeding kinematics and motor patterns of the nurse shark *Ginglymostoma cirratum*. *Environmental Biology of Fishes* 74:163-174.
2005. Huber, D.R., T.G. Eason, **R.E. Hueter** and P.J. Motta. Analysis of the bite force and mechanical design of the feeding mechanism of the durophagous horn shark *Heterodontus francisci*. *Journal of Experimental Biology* 208:3553-3571.
2005. Keeney, D.B., M.R. Heupel, **R.E. Hueter** and E.J. Heist. Microsatellite and mitochondrial DNA analyses of the genetic structure of blacktip shark (*Carcharhinus limbatus*) nurseries in the northwestern Atlantic, Gulf of Mexico, and Caribbean Sea. *Molecular Ecology* 14:1911-1923.
2005. **Hueter, R.E.**, Heupel, M.R., E.J. Heist and D.B. Keeney. Evidence of philopatry in sharks and implications for the management of shark fisheries. *Journal of Northwest Atlantic Fishery Science* 35:239-247.
2005. **Hueter, R.**, J. Gonzalez-Cano, R. de la Parra, J. Tyminski, J. Perez-Ramirez and F. Remolina-Suarez. Biological studies of large feeding aggregations of whale sharks (*Rhincodon typus*) in the southern Gulf of Mexico. International Whale Shark Conference, Perth, Western Australia:29.
2005. **Hueter, R.**, J. Gonzalez Cano, F. Remolina Suarez, R. de la Parra, J. Tyminski and J. Perez Ramirez. Whale shark summer feeding grounds where the Gulf of Mexico meets the Caribbean Sea., 21<sup>st</sup> Annual Meeting of the American Elasmobranch Society / Joint Meeting of Ichthyologists & Herpetologists, Tampa, Florida.
2005. Tyminski, J.P., **R.E. Hueter** and C.A. Simpfendorfer. Relative abundance and long-term movement patterns of juvenile blacktip sharks, *Carcharhinus limbatus*, in three Florida Gulf coastal nursery areas, 1995-2004. 21<sup>st</sup> Annual Meeting of the American Elasmobranch Society / Joint Meeting of Ichthyologists & Herpetologists, Tampa, Florida.
2005. Tyminski, J., C. Simpfendorfer and **R. Hueter**. Results of Mote Shark Tagging Program for blacktip (*Carcharhinus limbatus*) and sandbar (*C. plumbeus*) sharks. SEDAR 11-DW-44.
2005. Simpfendorfer, C., J. Tyminski, and **R. Hueter**. Large coastal shark surveys in eastern Gulf of Mexico, 2001-2004. SEDAR LCS05/06-DW-43.
2004. Smith, M., D. Warmolts, D. Thoney and **R. Hueter** (eds.). *The Elasmobranch Husbandry Manual: Captive Care of Sharks, Rays and their Relatives*. Special Publ., Ohio Biolog. Survey, xv+ 589 p.
2004. **Hueter, R.E.**, Heupel, M.R., E.J. Heist and D.B. Keeney. Evidence of philopatry in sharks and implications for the management of shark fisheries. *e-Journal of Northwest Atlantic Fishery Science* 35, art. 7 (<http://journal.nafo.int/35/7-hueter.html>).
2004. Heupel, M.R., C.A. Simpfendorfer and **R.E. Hueter**. Estimation of shark home ranges using passive monitoring techniques. *Environmental Biology of Fishes* 71:135-142.
2004. **Hueter, R.E.**, D.A. Mann, K.P. Maruska, J.A. Sisneros and L.S. Demski. Sensory biology of elasmobranchs. *In Biology of Sharks and their Relatives*, J. Carrier, J. Musick and M. Heithaus, eds. CRC Press, Boca Raton, Florida, p. 325-368.
2004. **Hueter, R.E.**, J. Gonzalez Cano, F. Remolina Suarez and J. Tyminski. Studies of an exceptionally large feeding aggregation of whale sharks (*Rhincodon typus*) off Quintana Roo, Mexico. 8th European Elasmobranch Association Conference, London UK.

2004. Heupel, M.R. and **R.E. Hueter**. Sharks and satellite tagging: achieving the potential. Workshop Report April 2004 submitted to NOAA/NMFS. MML Technical Report No. 962.
2004. **Hueter, R.** Highly Migratory Shark Fisheries Research by the National Shark Research Consortium. Semi-Annual Performance Report submitted January 2004 to NOAA/NMFS. MML Technical Report No. 946.
2004. **Hueter, R.** Highly Migratory Shark Fisheries Research by the National Shark Research Consortium. Semi-Annual Report submitted July 2004 to NOAA/NMFS. MML Tech. Rpt. 1002.
2004. **Hueter, R.** Cooperative Shark and Ray Research in the Southeast Region by the Center for Shark Research, 2001-2003. Final Report submitted to NOAA/NMFS. MML Tech.Report.954.
2003. Heupel, M.R., C.A. Simpfendorfer and **R.E. Hueter**. Running before the storm: blacktip sharks respond to falling barometric pressure associated with Tropical Storm Gabrielle. *Journal of Fish Biology* 63:1357-1363.
2003. Keeney, D.B., M.R. Heupel, **R.E. Hueter** and E.J. Heist. Genetic heterogeneity among blacktip shark, *Carcharhinus limbatus*, continental nurseries along the U.S. Atlantic and Gulf of Mexico. *Marine Biology* 143:1039-1046.
2003. Heupel, M.R., C.E. Simpfendorfer, and **R.E. Hueter**. Use of passive acoustic telemetry to examine the utilization of a coastal nursery ground by blacktip sharks. 17<sup>th</sup> International Society on Biotelemetry Meeting, Brisbane, Australia.
2003. **Hueter, R.E.**, J.L. Castillo-Geniz, J.F. Marquez-Farias, J.P. Tyminski. The role of Laguna Yalahau, Quintana Roo, Mexico as a primary nursery area for the blacktip shark (*Carcharhinus limbatus*). I Foro de Intercambio Científico Sobre Tiburones y Rayas, Guaymas, Sonora, Mexico.
2003. **Hueter, R.**, J. Tyminski, G. Cailliet, J. Bizzarro, W. Smith, F. Marquez-Farias, L. Castillo-Geniz, and C. Villavicencio-Garayzar. Results of a two-year survey of Mexican artisanal fisheries targeting sharks, skates and rays in the Gulf of California. American Fisheries Society Western Division and California-Nevada Chapter Joint Annual Meeting. San Diego, CA.
2003. **Hueter, R.E.**, J.P. Tyminski, J.L. Castillo-Geniz, and J.F. Marquez-Farias. Investigations of a primary nursery area for the blacktip shark, *Carcharhinus limbatus*, in Quintana Roo, Mexico. 19<sup>th</sup> Annual Meeting of the American Elasmobranch Society / Joint Meeting of Ichthyologists & Herpetologists, Manaus, Brazil.
2003. Keeney, D.B., Heupel, M.R., **Hueter, R.E.** and Heist, E.J. Phylogeography of the blacktip shark, *Carcharhinus limbatus*, based upon mitochondrial control region sequences. 19<sup>th</sup> Annual Meeting of the American Elasmobranch Society / Joint Meeting of Ichthyologists & Herpetologists, Manaus, Brazil.
2003. **Hueter, R.E.** Life History, Essential Habitat and Stock Assessment of Highly Migratory Sharks in U.S. and Mexican Waters: Fisheries Research by the Center for Shark Research, 2001-2002. Final Report for NOAA/NMFS Grant NA 16FM1658. Mote Technical Report No. 913.
2002. Heupel, M.R. and **R.E. Hueter**. Importance of prey density in relation to the movement patterns of juvenile blacktip sharks (*Carcharhinus limbatus*) within a coastal nursery area. *Marine and Freshwater Research* 53:543-550.

2002. **Hueter, R.E.**, M.R. Heupel, E.J. Heist and D.B. Keeney. The implications of philopatry in sharks for the management of shark fisheries. *Northwest Atlantic Fisheries Organization Research Document* SCR Doc. 02/122:1-9.
2002. Motta, P.J., **R.E. Hueter**, T.C. Tricas and A.P. Summers. Kinematic analysis of suction feeding in the nurse shark, *Ginglymostoma cirratum* (Orectolobiformes, Ginglymostomatidae). *Copeia* 2002:24-38.
2002. Simpfendorfer, C.A., M.R. Heupel and **R.E. Hueter**. Estimation of short-term centers of activity from an array of omnidirectional hydrophones and its use in studying animal movements. *Canadian Journal of Fisheries and Aquatic Sciences* 59:23-32.
2002. Simpfendorfer, C.A., **R.E. Hueter**, U. Bergman and S.M.H. Connett. Results of a fishery-independent survey for pelagic sharks in the western North Atlantic, 1977-1994. *Fisheries Research* 55:175-192.
2002. Heupel, M.R. and **R.E. Hueter**. Observation of philopatric behaviors in juvenile blacktip sharks. 18<sup>th</sup> Annual Meeting of the American Elasmobranch Society / Joint Meeting of Ichthyologists & Herpetologists, Kansas City, Missouri.
2002. Keeney, D.B., M.R. Heupel, **R.E. Hueter** and E.J. Heist. Investigation of female philopatry and stock structure among blacktip shark nurseries using mitochondrial haplotypes and microsatellites. 18<sup>th</sup> Annual Meeting of the American Elasmobranch Society / Joint Meeting of Ichthyologists & Herpetologists, Kansas City, Missouri.
2002. Heupel, M.R. and **R.E. Hueter**. Use of acoustic telemetry to passively monitor long-term movements of blacktip sharks. American Fisheries Society annual meeting abstracts, Baltimore, Maryland, August 18-22.
2002. Keeney, D.B., M.R. Heupel, **R.E. Hueter** and E.J. Heist. Genetic structure of blacktip shark continental nurseries based upon mitochondrial control region haplotypes and microsatellite loci. American Fisheries Society annual meeting abstracts, Baltimore, Maryland, August 18-22.
2002. Heupel, M.R. and **R.E. Hueter**. Passively monitoring the long-term movements of blacktip sharks in a nursery area. European Elasmobranch Association annual meeting abstracts, Cardiff, Wales, September 6-8.
2002. Heupel, M.R., C.A. Simpfendorfer and **R.E. Hueter**. Direct estimation of survival and mortality of juvenile blacktip sharks, *Carcharhinus limbatus*, using telemetry data. Elasmobranch Fisheries Symposium, Northwest Atlantic Fisheries Organization annual meeting abstracts, Santiago de Compostela, Spain, September 11-13.
2002. **Hueter, R.E.** The Center for Shark Research at Mote Marine Laboratory: mission, staff, activities and accomplishments. European Elasmobranch Association annual meeting abstracts, Cardiff, Wales, September 6-8.
2002. **Hueter, R.E.**, M.R. Heupel, E.J. Heist and D.B. Keeney. The implications of philopatry in sharks for the management of shark fisheries. Elasmobranch Fisheries Symposium, Northwest Atlantic Fisheries Organization annual meeting abstracts, Santiago de Compostela, Spain, Sept 11-13.
2002. **Hueter, R.E.**, J. Tyminski, G. Cailliet, J. Bizzarro, W. Smith, F. Marquez-Farias, L. Castillo-Geniz and C. Villavicencio-Garayzar. Artisanal fisheries for sharks, skates and rays in the Gulf of California. I Foro Científico de Pesca Riberena (First Scientific Forum on Coastal Fisheries) meeting abstracts, Guaymas, Mexico, October 17-18.

2002. **Hueter, R.E.**, J. Tyminski, J. Gelsleichter, M.R. Heupel, C.A. Simpfendorfer. Florida Gulf coast shark nursery essential fish habitat: distribution, dynamics, environmental quality and management benefits. American Fisheries Society annual mtg., Baltimore, MD, August 18-22.
2002. **Hueter, R.E.** and J.P. Tyminski. U.S. Shark Nursery Research Overview, Center for Shark Research, Mote Marine Laboratory 1991-2001. Final Report submitted to NOAA/NMFS, Narragansett, RI. Mote Marine Laboratory Technical Report No. 816.
2001. Wilga, C.D., **R.E. Hueter**, P.C. Wainwright and P.J. Motta. Evolution of upper jaw protrusion mechanisms in elasmobranchs. *American Zoologist* 41:1248-1257.
2001. Heupel, M.R. and **R.E. Hueter**. Use of an automated acoustic telemetry system to passively track juvenile blacktip shark movements. In *Electronic Tagging and Tracking in Marine Fisheries* (J.R. Sibert and J.L.Nielsen, eds.), pp. 217-236. Kluwer Acad. Publ., Netherlands.
2001. **Hueter, R.E.** Historical perspectives: Perry W. Gilbert. *Copeia* 2001(1):279-284.
2001. **Hueter, R.E.**, C.J. Murphy, M. Howland, J.G. Sivak, J.R. Paul-Murphy and H.C. Howland. Refractive state and accommodation in the eyes of free-swimming vs. restrained juvenile lemon sharks (*Negaprion brevirostris*). *Vision Research* 41:1885-1889.
2001. Pretlow-Edmonds, M.A., P.J. Motta and **R.E. Hueter**. Food capture kinematics of the suction feeding horn shark, *Heterodontus francisci*. *Environmental Biology of Fishes* 62:415-427.
2001. Manire, C., **R. Hueter**, E. Hull and R. Spieler. Serological changes associated with gill-net capture and restraint in three species of sharks. *Trans. Amer. Fisheries Soc.* 130:1038-1048.
2001. Tyminski, J.P., C.A. Simpfendorfer, C.A. Manire, and R.E. Hueter. Growth rates of bonnethead sharks, *Sphyrna tiburo*, from the west coast of Florida estimated from tag-recapture data. 17<sup>th</sup> Annual Meeting of the American Elasmobranch Society / Joint Meeting of Ichthyologists & Herpetologists, University Park, Pennsylvania.
2000. Oliver, L.J., M. Salmon, J. Wyneken, **R. Hueter** and T.W. Cronin. Retinal anatomy of hatchling sea turtles: anatomical specializations and behavioral correlates. *Marine and Freshwater Behaviour and Physiology* 33:233-248.
2000. **Hueter, R.E.**, G.M. Cailliet, J.F. Marquez Farias, J.L. Castillo Geniz and C.J. Villavicencio Garayzar. Artisanal fisheries for elasmobranchs in the Gulf of California: a multi-institutional project. American Elas. Soc./American Soc. of Ichs. & Herps. Ann. Mtg. Abs.:203.
2000. Marquez Farias, J.F., J.T. Tyminski, **R.E. Hueter**, P.M. Sanchez, A. Landa Ocana, E. Gonzalez Corona and Z. Mijangos Alquisires. The artisanal elasmobranch fishery in Sonora. 16<sup>th</sup> Annual Meeting of the American Elasmobranch Society / Joint Meeting of Ichthyologists & Herpetologists, La Paz, Baja California Sur, Mexico.
2000. Heupel, M.R. and **R.E. Hueter**. Patterns of movement by neonate blacktip sharks, *Carcharhinus limbatus*, within a coastal nursery area. 16<sup>th</sup> Annual Meeting of the American Elasmobranch Society / Joint Meeting of Ichthyologists & Herpetologists, La Paz, Baja California Sur, Mexico.
2000. Hepworth, D.A., **R.E. Hueter**, C.A. Manire and J.M. Hoenig. Assessing post-release mortality of coastal sharks using a logistic model of relative survival. 16<sup>th</sup> Annual Meeting of the American Elasmobranch Society / Joint Meeting of Ichthyologists & Herpetologists, La Paz, Baja California Sur, Mexico.

2000. C. Simpfendorfer, U. Bergman, S. Connett and **R. Hueter**. Estimation of changes in the relative abundance of pelagic sharks in the northwestern Atlantic based on data from a fishery-independent survey. Intl. Pelagic Shark Workshop (Feb 14-17, 2000, Pacific Grove, CA) Abs.:18.
1999. Bergman, U., S. Connett, C. Simpfendorfer and **R. Hueter**. A remarkably consistent fishery-independent measure of the relative abundance of large coastal and pelagic shark species inhabiting the northwestern Atlantic, 1976-1994. 15<sup>th</sup> Annual Meeting of the American Elasmobranch Society / Joint Meeting of Ichthyologists & Herpetologists, University Park, Pennsylvania.
1999. Haenni, E.G., J.P. Wourms, C.A. Manire and **R.E. Hueter**. Embryological development of the cephalofoil in the bonnethead shark, *Sphyrna tiburo*. 15<sup>th</sup> Annual Meeting of the American Elasmobranch Society / Joint Meeting of Ichthyologists & Herpetologists, University Park, Pennsylvania.
1999. Smith, W.D., J.J. Bizzarro, E.M. Jones, J.A. Neer, J. Tyminski, J.F. Marquez-Farias, G.M. Cailliet and **R.E. Hueter**. A preliminary assessment of the elasmobranch fishery in the northern Gulf of California, Mexico. 15<sup>th</sup> Annual Meeting of the American Elasmobranch Society / Joint Meeting of Ichthyologists & Herpetologists, University Park, Pennsylvania.
1999. Tyminski, J.P., E. Cortes, C.A. Manire and **R.E. Hueter**. Gastric evacuation and estimates of daily ration in the bonnethead shark, *Sphyrna tiburo*. 15<sup>th</sup> Annual Meeting of the American Elasmobranch Society / Joint Meeting of Ichthyologists & Herpetologists, University Park, Pennsylvania.
1999. **Hueter, R.E.**, G.M. Cailliet, C.J. Villavicencio-Garayzar, J.L. Castillo-Geniz, and J.F. Marquez-Farias. Current status of shark and ray artisanal fisheries in the Gulf of California: a multi-institutional project. VII Congress of the Association of Investigators of the Sea of Cortez and First International Symposium on the Sea of Cortez Mtg. Abs.:77.
1999. Marquez-Farias, J.F., J. Tyminski, **R.E. Hueter**, J.L. Castillo-Geniz, and C. Murillo. Diversity of harvested elasmobranchs in Sonora as determined from a survey of the artisanal fishery. VII Congress of the Association of Investigators of the Sea of Cortez and First International Symposium on the Sea of Cortez Mtg. Abs.:75.
1999. Smith, W.D., J.J. Bizzarro, E.M. Jones, J.A. Neer, J. Tyminski, J.F. Marquez-Farias, G.M. Cailliet and **R.E. Hueter**. Preliminary assessment of the elasmobranch fishery in the northern Gulf of California, Mexico. VII Congress of the Association of Investigators of the Sea of Cortez and First International Symposium on the Sea of Cortez Mtg. Abs.:202.
1999. **Hueter, R.E.** Early life history and relative abundance of blacktip and other coastal sharks in eastern Gulf of Mexico nursery areas, including bycatch mortality of sharks and associated fishes. Final report to NOAA/NMFS Southeast Regional Office, Cooperative Programs Division, St. Petersburg, FL. Mote Marine Laboratory Technical Report No. 630.
1999. **Hueter, R.E.** The status of shark and ray fishery resources in the Gulf of California: applied research to improve conservation and management. Report to National Fish and Wildlife Foundation. Mote Marine Laboratory Technical Report No. 628.
1999. **Hueter, R.E.** Center for Shark Research at Mote Marine Laboratory, 1997-1998. Final report to NOAA/NMFS Southeast Regional Office, Cooperative Programs Division, St. Petersburg, FL. Mote Marine Laboratory Technical Report No. 636.

1998. **Hueter, R.E.** (ed.). Science and Management of Shark Fisheries. *Fisheries Res.* 39:105-228.
1998. **Hueter, R.E.** Science and management of shark fisheries – Introduction. *Fisheries Res.* 39:105.
1998. **Hueter, R.E.** Philopatry, natal homing and localised stock depletion in sharks. *Shark News* 12:1-2.
1998. Gruber, S.H. and **R.E. Hueter**. Sensory biology of vision in the elasmobranchs. 14<sup>th</sup> Annual Meeting of the American Elasmobranch Society / Joint Meeting of Ichthyologists & Herpetologists, Guelph, Ontario, Canada.
1998. Gelsleichter, J., E. Cortés, C.A. Manire, **R.E. Hueter** and J.A. Musick. Evaluation of toxicity of oxytetracycline on growth of captive nurse sharks, *Ginglymostoma cirratum*. *Fishery Bulletin* 96:624-627.
1998. **Hueter, R.E.** Great White Sharks: The Biology of *Carcharodon carcharias* (book review). *Quarterly Review of Biology* 73:82.
1997. Motta, P.J., Tricas, T.C., **Hueter, R.E.** and A.P. Summers. Feeding mechanism and functional morphology of the jaws of the lemon shark *Negaprion brevirostris* (Chondrichthyes, Carcharhinidae). *Journal of Experimental Biology* 200:2765-2780.
1997. Gelsleichter, J.G., E. Cortés, C.A. Manire, **R.E. Hueter** and J.A. Musick. Use of calcein as a fluorescent marker for elasmobranch vertebral cartilage. *Trans. Amer. Fish. Soc.* 126:862-865.
1997. **Hueter, R.E.** Philopatry, natal homing and localized stock depletion in sharks: strictly a hypothesis. 13<sup>th</sup> Annual Meeting of the American Elasmobranch Society / Joint Meeting of Ichthyologists & Herpetologists, Seattle, Washington.
1997. **Hueter, R.E.**, C.A. Manire, L. Trent and T.J. Cody. Shark nurseries in coastal waters of the Gulf of Mexico. American Fisheries Society Ann. Mtg. Abs.: P-18.
1997. **Hueter, R.E.** Early life history and relative abundance of blacktip and other coastal sharks in eastern Gulf of Mexico nursery areas, including bycatch mortality of sharks and associated fishes. NOAA/NMFS/MARFIN Program annual meeting abstracts.
1996. **Hueter, R.E.** Catch/tag-and-release: the conservation option for recreational shark fishermen. *Shark News* 7:7.
1996. Cortés, E., C.A. Manire and **R.E. Hueter**. Diet, feeding habits and diel feeding chronology of the bonnethead shark, *Sphyrna tiburo*, in southwest Florida. *Bulletin of Marine Science* 58:353-367.
1996. **Hueter, R.E.**, C.A. Manire, L. Castillo-Géniz, F. Márquez-Farias and E. Cortés. Distribution and movements of juvenile sharks in coastal waters of the Gulf of Mexico. 12<sup>th</sup> Annual Meeting of the American Elasmobranch Society / Joint Meeting of Ichthyologists & Herpetologists, New Orleans, Louisiana.
1996. **Hueter, R.E.** Shark sense: scent, sight & sound. *The Edge - Big Game Fishing Journal* 9:46-57.
1995. Manire, C.A., L.E.L. Rasmussen, D.L. Hess and **R.E. Hueter**. Serum steroid hormones and the reproductive cycle of the female bonnethead shark, *Sphyrna tiburo*. *General and Comparative Endocrinology* 97:366-376.
1995. **Hueter, R.E.**, W.G. Fong, G. Henderson, M.F. French and C.A. Manire. Methylmercury concentration in shark muscle by species, size and distribution of sharks in Florida coastal waters.

*Water, Air, and Soil Pollution* 80:893-899. [Also reprinted as Hueter et al. (1995) in Porcella, D.B., J.W. Huckabee and B. Wheatley (eds.). *Mercury as a Global Pollutant*. Kluwer Academic Publishers, Dordrecht, The Netherlands, pp. 893-899.]

1995. **Hueter, R.**, C. Manire, L. Trent and L. Castillo-Géniz. Life and death in shark nursery areas of the Gulf of Mexico. *American Fisheries Society Ann. Mtg. Abs.*:127.
1995. **Hueter, R.E.** 1993 Southwest Florida Gulf Coast Shark Census. Mote Marine Laboratory Technical Report No. 408 (Final report to NOAA/NMFS, S-K Project NA37FD0086-01):113 pp.
1995. Motta, P.J., T.C. Tricas, **R.E. Hueter** and A.P. Summers. Feeding mechanics of the lemon shark: conservative motor and kinematic patterns. *American Zoologist* 35(5):103A.
1995. Sherman, R.L., C.A. Nelson, **R. Hueter** and R.E. Spieler. Preliminary examination of gill surface area in two batoid elasmobranchs. *American Zoologist* 35(5):118A.
1995. Manire, C.A. and **R.E. Hueter**. Human impact on the shark nursery grounds of Tampa Bay. *Florida Scientist* 58(2):107.
1994. Hull, E., C. Manire, **R. Hueter** and R. Spieler. Changes in blood parameters in stressed sharks due to capture and restraint. *American Zoologist* 34(5):36A.
1994. **Hueter, R.E.** The Great White Shark (book review). *Copeia* 1994:1057-1058.
1994. **Hueter, R.E.** The American Elasmobranch Society. *Fisheries* 19:40.
1994. **Hueter, R.E.** and C.A. Manire. Bycatch and catch-release mortality of small sharks in the Gulf coast nursery grounds of Tampa Bay and Charlotte Harbor. Mote Marine Laboratory Technical Report No. 368 (Final report to NOAA/NMFS, MARFIN Project NA17FF0378-01):183 pp.
1994. **Hueter, R.E.** and C.A. Manire. Bycatch and catch-release mortality of small sharks and associated fishes in the estuarine nursery grounds of Tampa Bay and Charlotte Harbor. Mote Marine Laboratory Tech. Rept. No. 367 (Final report to Florida DEP, Project 7237/7849):181 pp.
1994. **Hueter, R.E.**, C.A. Manire and M.R. Friday. Shark nurseries of the eastern Gulf of Mexico: biology and fisheries-related mortality of juvenile sharks in Tampa Bay and Charlotte Harbor, Florida. 10<sup>th</sup> Annual Meeting of the American Elasmobranch Society / Joint Meeting of Ichthyologists & Herpetologists, Los Angeles, California.
1994. **Hueter, R.E.**, C.J. Murphy, H.C. Howland and M. Howland. Dynamic refractive state and accommodation in the eyes of free-swimming vs. restrained lemon sharks (*Negaprion brevirostris*). 10<sup>th</sup> Annual Meeting of the American Elasmobranch Society / Joint Meeting of Ichthyologists & Herpetologists, Los Angeles, California.
1993. **Hueter, R.E.** Elasmobranchs (and all other organisms) as biotic resources. 9<sup>th</sup> Annual Meeting of the American Elasmobranch Society / Joint Meeting of Ichthyologists & Herpetologists, Austin, Texas.
1993. Manire, C.A. and **R.E. Hueter**. Human impact on the shark nursery grounds of Tampa Bay. *Florida Scientist* 56(Suppl. 1):27.
1993. Manire, C.A. and **R.E. Hueter**. Distribution and seasonal movements of sharks in Tampa Bay and Charlotte Harbor, Florida. 9<sup>th</sup> Annual Meeting of the American Elasmobranch Society / Joint Meeting of Ichthyologists & Herpetologists, Austin, Texas..

1992. Gruber, S.H. and **R.E. Hueter**. The ecomorphology of vision in sharks. 8<sup>th</sup> Annual Meeting of the American Elasmobranch Society / Joint Meeting of Ichthyologists & Herpetologists, Champaign-Urbana, Illinois.
1992. **Hueter, R.E.**, S.J. Zeiner and R.S. DesRochers. Tagging small sharks in the estuarine nursery grounds of Tampa Bay and Charlotte Harbor, Florida. 8<sup>th</sup> Annual Meeting of the American Elasmobranch Society / Joint Meeting of Ichthyologists & Herpetologists, Champaign-Urbana, Illinois.
1991. **Hueter, R.E.** Survey of the Florida recreational shark fishery utilizing shark tournament and selected longline data. Mote Marine Laboratory Technical Report 232A (Final report to Florida DNR, Project 6627):94 pp.
1991. **Hueter, R.E.** The rise and fall of recreational "kill" tournaments for sharks in Florida: historical trends, research potential, and the conservation movement. *Journal of Australian Marine and Freshwater Research*, Sharks Down Under Conference, Sydney, Australia.
1991. Motta, P.J., **R.E. Hueter** and T.C. Tricas. An electromyographic analysis of the biting mechanism of the lemon shark, *Negaprion brevirostris*: functional and evolutionary implications. *Journal of Morphology* 210:55-69.
1991. **Hueter, R.E.** Adaptations for spatial vision in sharks. *J. Experimental Zoology Suppl.* 5:130-141.
1991. **Hueter, R.E.** and P.W. Gilbert. The sensory world of sharks. *Underwater Naturalist* 19/20:48-55.
1991. Gruber, S.H., ed. Discovering Sharks (J. Carrier, **R. Hueter** and S. Moss, scientific eds.). American Littoral Society Special Pub. 14:122 pp. American Littoral Society, Highlands, NJ.
1991. **Hueter, R.E.** Sportfishing tournaments for sharks in Florida, 1975-1990. 7<sup>th</sup> Annual Meeting of the American Elasmobranch Society / Joint Meeting of Ichthyologists & Herpetologists, New York, New York.
1990. **Hueter, R.E.** and J.L. Cohen, eds. Vision in Elasmobranchs: A Comparative and Ecological Perspective. *Journal of Experimental Zoology Suppl.* 5:1-182.
1989. **Hueter, R.E.**, J.L. Cohen and D.T. Organisciak. Visual sensitivity in juvenile vs. adult lemon sharks: a mismatch resolved. 6<sup>th</sup> Annual Meeting of the American Elasmobranch Society / Joint Meeting of Ichthyologists & Herpetologists, San Francisco, California.
1988. **Hueter, R.E.** Retinotectal projection, retinal topography, and implications for the visual ecology of the juvenile lemon shark (*Negaprion brevirostris*). 5<sup>th</sup> Annual Meeting of the American Elasmobranch Society / Joint Meeting of Ichthyologists & Herpetologists, Ann Arbor, Michigan.
1988. **Hueter, R.E.** The organization of spatial vision in the juvenile lemon shark (*Negaprion brevirostris*): retinotectal projection, retinal topography, and implications for the visual ecology of sharks. Ph.D. dissertation, University of Florida, Gainesville, Florida. 130pp.
1982. **Hueter, R.E.** and S.H. Gruber. Recent advances in studies of the visual system of the juvenile lemon shark (*Negaprion brevirostris*). *Florida Scientist* 45:11-25.
1980. **Hueter, R.E.** Physiological optics of the eye of the juvenile lemon shark (*Negaprion brevirostris*). M.S. thesis, University of Miami, Coral Gables, Florida. 145pp.



# **OCEARCH NORTH ATLANTIC WHITE SHARK RESEARCH**

## **2018 Expedition Projects**

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***NOTE: Projects described below are as of November 2017. Details and collaborators will be modified in 2018 as expedition plans develop.***

### **Expedition Lead Investigators**

**B. Franks – Jacksonville University**

 **– South Carolina Department of Natural Resources**

**M. Hyatt – Adventure Aquarium**

**R. Hueter, OCEARCH Chief Science Advisor – Mote Marine Laboratory**

**Others TBA with each expedition (3 planned)**

### **Projects and Principal Investigators**

#### **I. Antibiotic-producing bacteria associated with white sharks as an application for human health**

**K. Ritchie – University of South Carolina, Beaufort**

Bacterial resistance to antibiotics is a growing, major problem for human medicine. Studies exploring innate immunity via bacterial associations play an important role in identifying mutualistic interactions between bacteria and host organisms, and how this can be applied for human medical therapies. The search for new antibiotics has led us to sharks, which display an unusually rapid rate of wound healing with a low rate of infection. Objectives of this study are to survey bacteria associated with the epidermal surfaces of white sharks as: (1) a study to address bacterial roles in innate immunity; and (2) a novel source of antibiotics. Bacteria are being cultured, purified and screened against 8 human and 3 marine pathogens for antibiotic potential.

## **II. Movements of white sharks in the Atlantic Ocean**

██████████ – Woods Hole Oceanographic Institution

R. Hueter, ██████████ – Mote Marine Laboratory

The objectives of this research are to examine fine- and broad-scale movements, habitat use, site fidelity, residency, and feeding behavior of white sharks in the northwest Atlantic Ocean using multiple technologies including passive acoustic telemetry and satellite-based tagging. We are tagging white sharks with individually coded acoustic transmitters, as well as pop-up satellite (PSAT) and real-time satellite (SPOT) tags. Shark movements and behavior are passively tracked using acoustic receiver arrays. Movements will be correlated with those of prey species, which include gray seals and North Atlantic right whales.

## **III. Physiological effects of capture stress in the white shark**

██████████ – Wildlife Conservation Society/New York Aquarium

M. Hyatt – Adventure Aquarium

██████████ – University of Massachusetts

Given the importance of white shark post-release survivorship to population growth, a detailed assessment of the physical and physiological effects of capture and their subsequent impacts on survivorship is warranted. The objectives of the current study are to: (1) quantify relative acid-base, electrolyte, and metabolite disturbances in the blood of white sharks exposed to capture, air exposure, and handling; (2) examine immediate and delayed post-release mortality with satellite tracking; and (3) characterize post-release recovery in this species using accelerometry.

## **IV. Reproduction in white sharks**

J. Gelsleichter – University of North Florida

Little is known of the reproductive biology of the white shark in the western North Atlantic. We are taking advantage of direct access to live animals on the M/V OCEARCH to obtain blood for the analysis of reproductive hormones (estradiol and progesterone for females, testosterone for males) using commercially available chemiluminescence immunoassays. In addition, ultrasound technology is being used to assess the reproductive status of females. In males, clasper characteristics will be qualified and quantified. Our objectives are to assess reproductive condition, reproductive cycle, gestation period, and fecundity. Of particular interest is to survey locations in the western North Atlantic that are serving as sites for white shark mating and pupping.

## **V. Trophic ecology of white sharks in the western North Atlantic**

 – Woods Hole Oceanographic Institution

– Mote Marine Laboratory

Understanding the trophic ecology of white sharks is important because as apex predators, they are likely to have a disproportionate influence on food web structure in coastal oceans. Conventional bulk stable isotope analyses used to determine trophic position (TP) are challenging for highly migratory species, such as white sharks, that move through isotopically distinct food webs and shift diets seasonally and ontogenetically. Recent advances in compound-specific stable isotope analysis (e.g. individual amino acids) have significantly reduced the influence of potentially confounding variables (shifting TP and different isotopic baselines) when determining TP of highly migratory species. Compound-specific stable isotope analyses are being conducted on muscle tissue from sharks sampled on the OCEARCH to examine temporal shifts in TP, changes in isotopic baseline values, and/or migration between isotopically distinct habitats.

## **VI. White shark ectoparasites**

 - Auburn University

Ectoparasites commonly infect white sharks and are primarily represented by siphonostomes (Siphonostomatoida, Copepoda). Few of the parasite species are exclusive parasites of white sharks, but rather they are species which also infect a variety of others elasmobranchs and not necessarily those species with the closest phylogenetic ties to the white shark. The wide-ranging travels of large white sharks may provide an opportunity for such species-rich infections by placing the potential host in a wide variety of different habitats throughout the year where other, less migratory sharks and their ectoparasites exist. With the above in mind, the primary purpose of this project is to collect baseline ectoparasite data (parasite species presence, abundance, and infection site) from large white sharks to see if the aforementioned cases represent anomalies or a more general characteristic of white sharks worth further investigation.

## **VII. Comparative analysis of DNA sequence variation in the white shark**

**G. Naylor – College of Charleston/University of Florida**

There are now a number of documented cases where pelagic fish species, like white sharks, that routinely migrate thousands of kilometers across the world's oceans show striking

genetic sub-structure among populations. Such restricted gene flow in the face of extensive individual movement is generally taken to be an indicator of fidelity to a breeding site. Animals may range far and wide but return to the same site/region to breed. It follows from this that contrasting population genetic data with information from tracking studies can yield insights into breeding behavior and the incidence of philopatry. Our objective is to determine the global population structure among white sharks to provide a baseline against which tracking data can be interpreted. We will contrast population structure in white sharks deduced from comparative analysis of DNA sequence data with tracking information from the OCEARCH satellite tagging program.

### **VIII. Contaminants of emerging concern in white sharks from U.S. Atlantic waters**

#### **██████████ – Cape Canaveral Scientific**

Contaminants of emerging concern (CESs) include flame retardants, pharmaceuticals, personal care products, and an array of other anthropogenic pollutants released into aquatic environments that can readily accumulate within biological matrices of fish and other biota on a global scale. The direct effects of CESs on marine biota and the fate of these potentially toxic compounds in marine systems are not well understood. Anthropogenically based CESs can serve as endocrine disruptors that alter normal endocrine system function and subsequently cause adverse effects in aquatic organisms or their progeny. We will analyze a full array of CESs in blood plasma, red blood cells, and available tissue types collected from live white sharks from US waters during OCEARCH research operations. These first efforts will be a significant step forward to better understand current concentrations of CESs in the western North Atlantic white shark population.

### **IX. Nutritional markers in elasmobranchs sampled in the western North Atlantic**

#### **L. Hoopes – Georgia Aquarium**

#### **██████████ – Wildlife Conservation Society/New York Aquarium**

Despite their ecological importance as top predators in marine ecosystems, few studies have monitored nutritional parameters in wild sharks. Understanding nutritional markers in free-ranging elasmobranchs can lend insight into the health of the animal and reveal clues about their diet in the wild. The goal of this project is to monitor nutritional markers in white sharks and other elasmobranch species to evaluate health and diet in wild populations. Traditional nutritional parameters like trace minerals and vitamin levels will provide much needed baseline information about the nutritional health of the individual, while other

nutritional markers, like fatty acids, can be used as non-invasive tracers in the investigation of diet since polyunsaturated fatty acids cannot be synthesized by elasmobranchs and must be obtained from the diet. This technique has the potential to provide information about the different dietary niches occupied by immature and mature white sharks and geographical dietary preferences across their Atlantic migration routes.

#### **X. Visual physiology of white sharks**

**C. Bedore – Georgia Southern University**

**R. Hueter – Mote Marine Laboratory**

The capabilities of sensory systems are correlated to the physical properties of the habitat in which they are used. To understand the sensitivity of white shark visual systems, we will (1) record eye size and total length, (2) measure the speed and magnitude of pupil constriction, and (3) correlate eye and pupil size to light habitat estimated from satellite tag data as sharks migrate between shallow and deep water, as well as across ocean basins. Understanding visual sensitivity of white shark eyes will help us to understand how these sharks forage and migrate in a wide range of spectral habitats.

#### **XI. Semen analysis of white sharks**

**M. Hyatt – Adventure Aquarium**

 – **South Eastern Zoological Alliance for Reproductive Conservation (SEZARC)**

Little is known on standardized semen collection and analysis in white sharks. Sperm motility, viability, and morphology not only can add to the health assessment, but also to predict sperm maturation and time to breeding. Understanding the reproductive seasonality of mature male sharks when compared along with satellite tracking may help identify breeding grounds.

#### **XII. Caudal fin aspect ratio in white sharks**

 – **VithajSafari, South Africa**

The white shark is a ram-ventilator and constantly needs to swim, hence the caudal fin (tail) has a central role in white shark physiology. The objective of this research is to study the swimming mechanics of white sharks by creating an allometric model for the caudal fin aspect ratio. This is a ratio between the caudal fin area and the caudal fin height and may be used to calculate swimming speed, swimming style, and possibly metabolic scope by

knowing the shark's precaudal length. Precise measurements of the caudal fin are done using computer software with high-resolution photo documentation.

### **XIII. Assessing the health of Atlantic sharks via hematology, plasma biochemistry, protein electrophoresis, cholesterol electrophoresis, and acute phase proteins**

 – Wildlife Conservation Society

 University of Florida

**Michael Hyatt – Adventure Aquarium**

Blood is a fundamental body fluid and evaluation of the cellular and humoral composition is critical in evaluating the baseline health of all animals. Studies of normal red and white cell morphology and documented reference ranges for blood counts and serum/plasma analytes remain limited in the elasmobranch and veterinary literature. Those that are available demonstrate diverse cellular morphologies and biochemical profiles by species. Complete hematologic and biochemical indices are valuable to documenting the health of the individual animals, assessing animals for signs of acute or chronic anthropogenic stress, and contribute to what we know of the normal physiology and health of Atlantic shark populations as a whole. The intent of this study is: 1) document packed cell volume, complete blood and differential cell counts; 2) document red cell, white cell and thrombocyte morphology by light and electron microscopy; 3) perform complete plasma chemistry analysis including protein electrophoresis, cholesterol electrophoresis and acute phase proteins; 4) generate normal reference values and morphologies for hematologic and biochemical indices for a variety of shark species; 5) determine the health of examined individuals and Atlantic shark populations.

### **XIV. Prey identification in Atlantic white sharks through assessment of fecal DNA**

 – Wildlife Conservation Society/New York Aquarium

**L. Hoopes – Georgia Aquarium**

 – Southampton High School/Long Island Shark Collaboration

Reconstructing diets in elasmobranchs have previously depended on either indirect assessments of the food web (stable isotope analysis) or visual identification of prey remains within stomach contents either during post mortem evaluation or through the process of gastric lavage. The latter techniques provide taxonomically crude and in some studies biased

results and require either animal sacrifice or invasive techniques. Analyzing soft matrix material from fecal samples using DNA based techniques has recently been validated in a number of terrestrial and aquatic vertebrate species as a non-invasive alternative to identify prey items. Our objectives are to: 1) determine if molecular techniques can be used to recover prey DNA from fecal samples collected through a cloacal wash technique; 2) to use molecular diagnostic tools to sequence prey DNA from Atlantic white shark feces with generic and species specific mitochondrial DNA primers; and 3) compare these results with tissue stable isotope and plasma fatty acid levels to better define the diet of juvenile and adult Atlantic white sharks.

#### **XV. Gut microbiome composition of juvenile and adult white sharks**

 – Georgia Institute of Technology

**L. Hoopes – Georgia Aquarium**

**K. Ritchie – University of South Carolina, Beaufort**

The bacterial communities of the gastrointestinal tract play a critical role in regulating host development, immune homeostasis and metabolism, and disease state. The composition of the bacterial communities of the gut can be shaped by various factors, including diet, life stage, and environmental conditions. Our knowledge of the importance of the microbiome to animal health is well established for certain model species. However, for most animal groups, the diversity and function of microbiomes are almost completely unexplored. This is particularly true for marine species, including sharks. Determining the factors that affect shark microbiomes is critical for understanding host fitness and for explaining differences between ecosystems, species, and/or populations. Knowledge of microbiomes from sharks in the natural environment may also inform how we manage captive animals to maximize health. The goals of this study are to: 1) identify the gastrointestinal microbial communities from cloacal swabs of juvenile and adult white sharks; 2) characterize the physiological properties of the microbiomes to identify potential differences in metabolic pathways within each community; and 3) determine if the microbiome can be used as a screening tool of diet preference between differing life stages of white sharks. We are employing a combination of field sampling, microbiological methods, and high throughput sequence analysis. The results will enable a predictive understanding of microbiomes in shark health and ecology.

## EXPEDITION MAP AND VESSEL PHOTOS AND DESCRIPTIONS



Map of requested sampling areas for white sharks in Atlantic Canada. Study area includes: Atlantic coast of Nova Scotia, especially Mahone Bay and Bay of Fundy; south coast of Newfoundland, especially Placentia Bay; and waters adjacent to Sable Island.



M/V OCEARCH





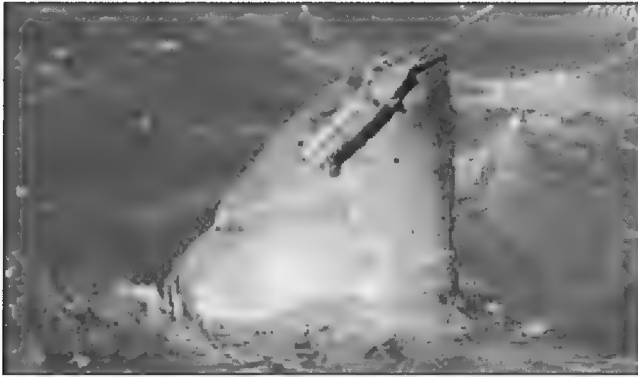
Blood draw from large white shark during the 15-20 min examination on the M/V OCEARCH hydraulic lift.



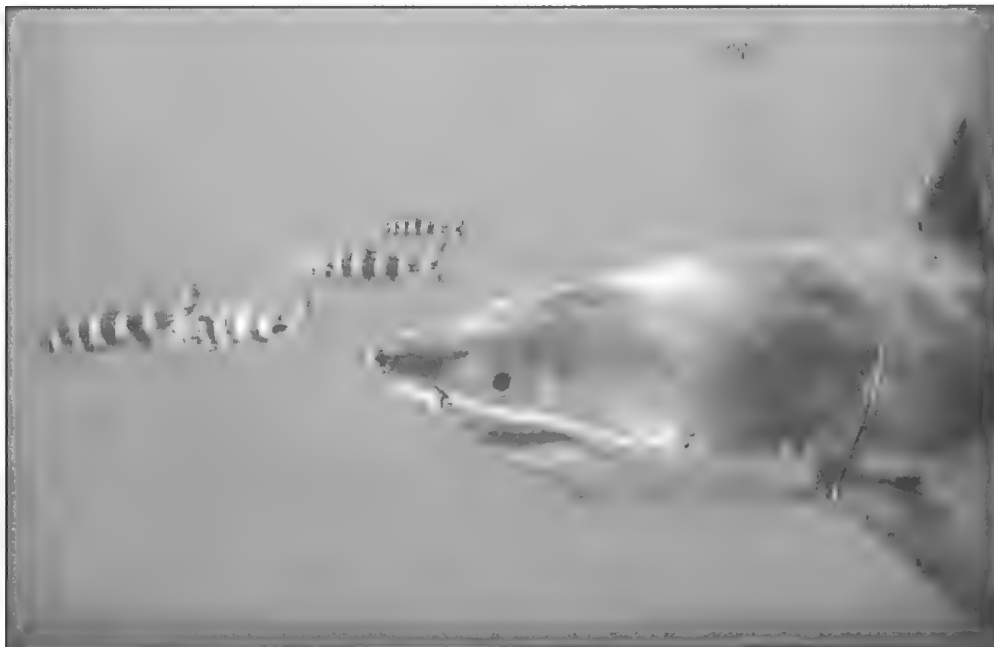
Attachment of SPOT satellite tag to white shark first dorsal fin on lift of M/V OCEARCH.



White shark swimming off lift after completion of 15-20 min examination and tag-attachment protocols.



White shark "Helen" tagged by OCEARCH, March 2012, off South Africa. Photo above shows 5-year SPOT tag in place when tagged and released; photo at right shows Helen's dorsal fin in October 2017, after tag was released. Fin shows no significant permanent damage or loss of function. Tag was attached at least through January 2017, when last signal was received.



White shark "Biteface" tagged by OCEARCH, Autumn 2009, off Guadalupe Island, Mexico. Photo taken Autumn of 2017, showing normal dorsal fin structure 8 yrs after SPOT tag attachment and release.



Contender, tender to the M/V OCEARCH – Hull ID# JDJ28593C111. 28 ft fiberglass build v-hull center console with T-top and dual outriggers. Powered by twin Yamaha 300 hp four-stroke outboard motors with 180-gal internal gasoline tank. Electronics include Foruno nav charts and finder, Standard Horizon radio, and a 24 v system.



SAFE boat, tender to the M/V OCEARCH – Hull ID# EGO01581D111N1267. 23 ft v-hull center console. Aluminum hull with blue vinyl hard foam sides. Powered by twin Yamaha 150 hp four-stroke outboard motors with 90-gal internal gasoline tank. Electronics include Garmin navigational charts, Foruno nav chart and finder, and a Standard Horizon radio.

**M/V OCEARCH Description**

The 126' M/V OCEARCH vessel, a former Alaskan crabber, has been converted to a world-class research vessel specializing in studying Great White Sharks. The impressive boat holds 50,000 gallons of diesel fuel and 7,000 gallons of gasoline, which give it a 10,000 nautical mile range and ample gasoline for its support boats. The vessel's electronics include two 72-mile-range radars, Nobeltec plotter, depth sounder/fish finder, satellite compass, auto-pilot, and satellite connections for phone and Internet. It can accommodate 20 people overnight in its seven staterooms.

Driven and powered by all Cat equipment, the OCEARCH ship features two 3412 turbocharged 800HP mains, which provide a cruising speed of 9 knots. In January 2012, Elite Diesel of Texas rebuilt both mains, which had spent a long life working in harsh commercial conditions. While getting it ready for its expedition all the way to South Africa and back, the decision was made to remove its Cat 3406 generators and replace them with a much more efficient set of new generators, a C4.4 99EKW and a C6.6 125EKW. The new generators proved a much better fit for the boat's new purpose, with tremendous fuel savings over those it replaced. In fact, they were such a success that another C4.4 99EKW was added when the boat returned from South Africa to bring its total to three power plants.

A truly unique feature of the OCEARCH is its custom lift that's rated up to 75,000 pounds. It allows leading scientists to safely conduct their varied studies of sharks while supported by the lift. Scientists have 15 minutes to draw blood, and take tissue samples and measurements, etc. A special SPOT tag is also placed on the dorsal fin of each shark for real-time tracking that helps better understand their migrations. The tagging information gathered has led us to their birthing grounds in the Eastern Pacific and the Atlantic.

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**PARTNERS**

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## **OCEARCH BOAT AND ENGINE SPECIFICATIONS**

126' long  
33' beam  
10' draft  
Physical weight 600 tons  
Diesel 50,000 gallons  
Gas 7,000 gallons  
Lube oil 700 gallons  
Ballast water 60,000 gallons  
Fresh water 8,000 gallons  
2x reverse osmosis water makers that can produce 1,800 gallons per day  
Each unit, 150 gallons per hour in total  
Speed 9 knots  
7 staterooms with 20 beds  
4 heads/bathrooms  
Lift capacity 75,000 pounds  
Knuckle crane 4,000 pounds  
Tenders- 28' Contender and 21' Safeboat  
Bridge electronics  
- 2x Furuno 72 mile radars  
- Nobeltec plotter  
- Furuno FCV 1100 depth machine  
- 2x Furuno GP32 GPS's  
- Furuno satellite compass  
- Robertson Auto Pilot  
- 2x Icom VHF radios  
- Iridium satellite phone  
- KVH Trac Phone for internet/phone  
- KVH Trac Vision for satellite TV

### **CAT Powered Mains and Engines:**

- 2x 3412 turbocharged after cooled 800hp mains
- 2x C4.4 99EKW marine generators
- 1x C6.6 125EKW marine generator
- 4x 25HP ballast pumps
- 2x 75HP hydraulic motors for custom lift
- 1x 50HP hydraulic motor for crane

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#### **PARTNERS**

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## MacDonald, Jennifer

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**From:** Sooley, Darrin  
**Sent:** March-06-18 1:00 PM  
**To:** MacDonald, Jennifer  
**Subject:** RE: Further information on OCEARCH methodology

Thanks Jenn:

It will be later next week before I can forward a draft of the permit rationale that we talked about I have just been too busy with " regional manager" tasks that I have had no time to focus on the permitting tasks that I am still responsible for.

I see your placeholder in the calender for tomorrow for call with OCEARCH but I have another meeting for same time and will not be able to be on the call but I am comfortable leaving the call with you and Donald I think we are all on the same page.

Darrin

---

**From:** MacDonald, Jennifer  
**Sent:** March-06-18 1:16 PM  
**To:** Sooley, Darrin  
**Subject:** FW: Further information on OCEARCH methodology

Hi Darrin,

I received the below from OCEARCH and so wanted to share the additional information with you.

I'm hoping to get you the draft permit and assessment document in the next couple of days.

Jenn

**Jennifer MacDonald**  
Species at Risk Management Division  
(902) 407-8175

---

**From:** Robert Hueter [<mailto:rhoeter@mote.org>]  
**Sent:** March-05-18 1:20 PM  
**To:** MacDonald, Jennifer  
**Cc:** Bowlby, Heather; Chris Fischer; [REDACTED] Danielle Pernette; Bryan Franks; Fernanda Ubatuba  
**Subject:** Further information on OCEARCH methodology

My apologies if this is a repeat message, I'm experiencing some problems with my computer and I'm not sure my first attempt went through --

Hi Jenn:

In conversations we've had with one of our Canadian NGO partners (Coastal Action), it was brought to our attention that questions are still being raised about the need for OCEARCH's methodology for studying large sharks. More

specifically, that everything we are doing can be done with non-capture methods such as being used by the Division of Marine Fisheries in Massachusetts. Nothing could be further from the truth, and to illustrate that, I put together the attached table comparing the two types of methodologies for your information.

In reviewing our SARA permit application please keep in mind that NOAA has closely scrutinized all of OCEARCH's methods and has issued us federal permits for our work in U.S. waters.

I'm including copies of our application and our document providing further requested information, for the benefit of the others on this email.

We look forward to discussing our request with you soon, and we hope to work with any and all DFO scientists who wish to take advantage of the opportunities OCEARCH presents for studies of these large sharks in Canadian waters.

Best regards,

Bob

--

**ROBERT E. HUETER, Ph.D.**

*Senior Scientist & Director, Center for Shark Research  
Perry W. Gilbert Chair in Shark Research  
Manager, Sharks & Rays Conservation Research Program  
Mote Marine Laboratory  
1600 Ken Thompson Parkway  
Sarasota, FL 34236 USA*

*Chief Science Advisor  
OCEARCH*

[rhuetter@mote.org](mailto:rhuetter@mote.org)

Tel: 941-388-1827

Fax: 941-388-4312

More info at: [www.mote.org](http://www.mote.org)

## MacDonald, Jennifer

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**From:** Humphrey, Donald  
**Sent:** March-06-18 8:23 PM  
**To:** MacDonald, Jennifer  
**Subject:** RE: Call with OCEARCH

If you can set something up for the week I am back, that would be preferred but if next week works better for them then please go ahead without me and give them some reassurance.

Thanks, Donald

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**From:** MacDonald, Jennifer  
**Sent:** March-06-18 3:47 PM  
**To:** Humphrey, Donald  
**Subject:** Call with OCEARCH

Hi Donald,

I haven't been able to line up a time this week where OCEARCH is available for a call at a time that we were both available. They have asked for a time next week – are you ok with me having a call with them directly or do you want me to wait until you're back the following week. Darrin has indicated he is fine with us talking with them and providing some reassurance as he sees no issues with issuing a permit.

Thanks,  
Jenn

### Jennifer MacDonald

Species at Risk Biologist | Biologiste des espèces en péril  
Species at Risk Management Division | Division de la gestion des espèces en péril  
Ecosystem Management | Gestion des écosystèmes  
Fisheries & Oceans Canada | Pêches & Océans Canada  
P.O. Box 1006 Dartmouth N.S. | C.P. 1006 Dartmouth N.E. B2Y 4A2  
Tel | Tél: (902) 407-8175 Fax | Téléc: (902) 426-2331  
Email | Courriel: [jennifer.macdonald@dfo-mpo.gc.ca](mailto:jennifer.macdonald@dfo-mpo.gc.ca)



**MacDonald, Jennifer**

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**From:** Gromack, Aimee  
**Sent:** March-07-18 12:00 PM  
**To:** MacDonald, Jennifer  
**Subject:** RE: Further information on OCEARCH methodology

Thanks for sharing this Jenn.

The comparison is good but it's too bad they didn't also compare their methods with a *capturing* and harpooning method (keeping them alongside the boat) as well. Even though you have already done that, it would be interesting to see what they would say about that. I wonder if they have any experience with that method.

I am also wondering about gastric lavage?! How do they flush stomach contents?

[REDACTED]. I don't see anything about this in the review form...

I am reading the review form now and look forward to reviewing the permit after lunch. I will let you know if I have any feedback ☺

Aimee

---

**From:** MacDonald, Jennifer  
**Sent:** March-06-18 12:45 PM  
**To:** Gromack, Aimee  
**Subject:** FW: Further information on OCEARCH methodology

Thought you might find the methods comparison interesting.  
Jenn

**Jennifer MacDonald**  
Species at Risk Management Division  
(902) 407-8175

---

**From:** Robert Hueter [<mailto:rhuetter@mote.org>]  
**Sent:** March-05-18 1:20 PM  
**To:** MacDonald, Jennifer  
**Cc:** Bowlby, Heather; Chris Fischer; [REDACTED]; Danielle Pernette; Bryan Franks; Fernanda Ubatuba  
**Subject:** Further information on OCEARCH methodology

My apologies if this is a repeat message, I'm experiencing some problems with my computer and I'm not sure my first attempt went through --

Hi Jenn:

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attached table comparing the two types of methodologies for your information.

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We look forward to discussing our request with you soon, and we hope to work with any and all DFO scientists who wish to take advantage of the opportunities OCEARCH presents for studies of these large sharks in Canadian waters.

Best regards,

Bob

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**ROBERT E. HUETER, Ph.D.**

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More info at: [www.mote.org](http://www.mote.org)

## MacDonald, Jennifer

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**From:** Gromack, Aimee  
**Sent:** March-07-18 2:42 PM  
**To:** MacDonald, Jennifer  
**Subject:** RE: White Shark permit docs  
**Attachments:** SARA Permit\_Assessment and Approval Form\_draft\_AG.docx; SARA-Permit-DRAFT\_AG.doc

**Follow Up Flag:** Follow up  
**Flag Status:** Completed

Hi Jenn,

I have a few comments. I know your questions are for Donald, but I put in my 2 cents ☺

I am happy to discuss this anytime.

Aimee

---

**From:** MacDonald, Jennifer  
**Sent:** March-01-18 8:25 AM  
**To:** Gromack, Aimee  
**Subject:** White Shark permit docs

Hi Aimee,

Here are the draft assessment document and permit for white shark. There are still a number of comments in it, but a lot of things are just notes I want to check with Donald, so don't worry too much about those. Any comments/input you have would be really appreciated!

Thanks!!

Jenn

### Jennifer MacDonald

Species at Risk Biologist | Biologiste des espèces en péril  
Species at Risk Management Division | Division de la gestion des espèces en péril  
Ecosystem Management | Gestion des écosystèmes  
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Fisheries and Oceans  
Canada

Pêches et Océans  
Canada

SARA Permit No: DFO-MAR-2017-17

## PERMIT ISSUED UNDER SECTION 73 OF THE *SPECIES AT RISK ACT*

Subject to the conditions described in this permit, the holder of this permit ("Permit Holder"), or any qualified person acting under the authority of the Permit Holder, is authorized under the authority of subsection 73(1) of the *Species at Risk Act*, S.C. 2002. c.29 (SARA) to engage in activities (as described in this permit) that **harm, harass, capture, and possess** individuals of the following threatened or endangered aquatic species listed on Schedule 1 of SARA:

**Commented [DF01]:** Ensure all should be included

**White Shark** (*Carcharodon carcharias*), Atlantic population

### Permit issued to:

Name: OCEARCH ("Permit Holder"):  
Attention to: George Christopher Fischer  
Address: 1790 Bonanza Drive, Suite 101B  
Park City, Utah, USA 84060  
Email: [chris@oceanarch.org](mailto:chris@oceanarch.org)  
Phone: (435) 645-8990 (office) [REDACTED] (cellular)

The following individual operating under the authority of Fisheries and Oceans Canada (DFO) as "Permit Holder", and those under his supervision, may undertake the activities authorized by this permit:

**Commented [DF03]:** This is not part of the template from NHQ

Name	Organization

**Commented [AG2]:** Will names of all researchers handling white sharks be included?

### Location of Proposed Activity

**This permit is only valid at the following location(s):**

Nearest community (city, town, village): N/A  
Municipality, district, township, county: N/A  
Province: N/A  
Name of watercourse(s), waterbody(ies): Atlantic Ocean  
Specific location: DFO Maritimes Region

**Commented [DF04]:** Application indicated the following:  
• Mahone Bay (44° 29.50' N / 64° 13.50' W and adjacent areas  
• Bay of Fundy (44° 54.00' N / 66° 32.50' W and adjacent areas  
• Sable Island (43° 56.14' N / 59° 56.59' W)

Should the permit be more specific?

### Valid Permit Period

This permit is valid from [REDACTED] until **December 31, 2018**

If the Permit Holder cannot complete the activity during this period, Fisheries and Oceans Canada (DFO) must be notified in advance of the expiration of the time period, as soon as the Permit Holder is aware.

**Commented [AG5R4]:** Could you be specific but also include the flexibility for them to go elsewhere if they notify DFO (for safety, we should be notifying beach goers and fish harvesters that may be in the area during chumming).

The period during which other conditions of this permit must be complied with are provided in their respective sections below. DFO may, where appropriate, amend this permit. In cases where the Valid Permit Period is extended, written notice and/or an amended permit will be provided to the Permit Holder.

**Commented [DF06]:** Expedition is planned from Sept 12 – Oct 11, 2018. Make the valid until date shorter?

Canada

.../2

- 2 -

SARA Permit No. : DFO-MAR-2017-17

### Description of the Activity

The purpose of the activity is to conduct scientific research on White Sharks in Canadian waters to gain a better understanding of the role of Canadian waters in the life history of the White Shark population in the northwest Atlantic Ocean, the range of the species within Canadian waters and health of White Sharks. The researchers will attach acoustic and satellite tags, as well as collect various biological samples, from up to 20 sharks in Canadian waters.

Commented [DF07]: Are we comfortable with that number?

Researchers will use chum to attract White Sharks in the study area to the fishing boat and larger research vessel. When a White Shark is sighted, either visually or using a drone, the fishing boat will target its fishing activities to attract and capture that shark. Chum bags, chum boxes, bait tanks, chum tubes and decoys may all be used to attract White Sharks to the fishing vessel. Once a White Shark is in the vicinity of the fishing vessel, the researchers will attempt to catch the shark using a 20/0 circle hook (zero offset) with a bite-blocker attached. In the case of a very large White Shark, a 27/0 circle hook (zero offset) with a buoy to prevent swallowing of the hook will be used. Once caught, the White Shark will be guided onboard the hydraulic lift on the research vessel, which is then raised above the waterline. While on the lift, sharks will be provided with oxygenated seawater via a mouthpiece and tube.

Commented [AG8]: How large?

Once on the lift, internal acoustic tags will be implanted surgically in the coelomic cavity and the incision will be sutured. Smart Position and Temperature (SPOT) tags will be attached on the leading edge of the first dorsal fin by drilling four holes in the dorsal fin with an electric drill and attaching the tag with nylon bolts, stainless steel locknuts and plastic spacers. The hardware is designed to retain the tag for five years after which it will fail and the tag will detach. All White Sharks caught, up to 20, will have both acoustic and SPOT tags applied. Pop-up Archival Satellite Tags (PSAT) will be attached via a tether to a subdermal metal dart implanted in the shark's flank below the first dorsal fin. PSAT tags will be attached to up to 6 White Sharks caught.

The researchers will also collect samples (blood, muscle, semen, fecal and urine samples), conduct skin, gill and cloacal swabs, collect parasites, collect eye and tail measurements, and perform an ultrasound (females). Samples will be collected using a hypodermic puncture and biopsy punch.

The activities authorized by this permit consist of:

- Actively attracting White Sharks to a vessel;
- Catching White Sharks and lifting individuals out of the water on a hydraulic lift;
- Collecting blood and tissue samples;
- Implanting internal acoustic tags; and
- Attaching SPOT and PSAT tags.

Commented [DF09]: Specify methodologies here?

The effects that the activity may cause to the listed wildlife species and the effects of those changes authorized by this permit are as follows:

- Harm, harassment, capture and possession of listed aquatic species at risk.

.../3

- 3 -

SARA Permit No. : DFO-MAR-2017-17

## Terms and Conditions of Permit

The activity must be carried on in accordance with the following conditions:

### 1. General Conditions

- 1.1. A copy of this permit shall be kept on site at all times in the possession of the Permit Holder or a person acting under the Permit Holder's authority, and shall be made available to an enforcement officer upon request.
- 1.2. All persons undertaking the activity under the authority of the Permit Holder shall do so under the direction and oversight of the Permit Holder and shall be made familiar with the conditions of this permit.
- 1.3. The activity must comply with the conditions identified within this permit. Activities that affect individuals of species at risk, their residences, or their critical habitat, other than those specifically identified within this permit are not authorized under this permit.
- 1.4. No changes to the Permitted activities shall take place without prior consultation with DFO, and written approval from DFO, Species at Risk Management Division. Contact information as follows:

Species at Risk Management Division  
Fisheries and Oceans Canada  
P.O. Box 1006  
Dartmouth, NS, B2Y 4A2  
email: [SpeciesatRisk.xmar@dfo-mpo.gc.ca](mailto:SpeciesatRisk.xmar@dfo-mpo.gc.ca)  
phone: 1-866-891-0771 fax: 1-902-426-2331

### 2. Conditions to avoid or minimize the impact of the activity on the species:

- 2.1. [Activity] shall be undertaken by or under the direct supervision of an individual who is qualified to [enter qualifications- where special qualifications are necessary].
- 2.2. To the extent possible, activities shall be conducted in a manner whereby any individuals of the species shall be handled only in the circumstances authorized under this permit and with the least amount of harm.]
- 2.3. The following measures shall be implemented to minimize the impact of the activity on the species:
  - 2.3.1. White Sharks shall not be chased by the vessel.
  - 2.3.2. The following gear shall be used: circle hooks (either 20/0 or 27/0 with zero offset) rigged with a cross bar bit-blocker (30cm up the leader) and attached to a stainless steel wire rope (3/32" or 1/8"). The leader shall be 10m in length and shall be attached to a braid rope with elasticity properties. Leaders shall be embedded inside a three-strand rope to increase the diameter.
  - 2.3.3. Individual White Sharks shall not be kept on the research platform for longer than 20 minutes.
  - 2.3.4. While on the research platform, oxygenated seawater shall be pumped through a hose and mouthpiece into the shark's buccal cavity at all times.
  - 2.3.5. While on the research platform, a tail rope shall be used to prevent the animal from causing harm to itself and others.
  - 2.3.6. While on the research platform, the head and eyes shall be covered with wet terrycloth towel to reduce animal stress and keep eyes moist.
  - 2.3.7. While on the research platform, the skin shall be kept wet.
  - 2.3.8. While on the research platform animal stress shall be monitored by observing skin colouration, presence of blood pooling, gill movements, and animal activity. If stress is visually detected in the animal, a blood sample shall be taken to evaluate the shark's conditions. If acute stress is observed, the animal shall be released immediately.

Commented [AG10]: Can we use the word "must"?

Commented [DF011]: These are from the template, but don't appear in other MAR region permits

Commented [DF012]: Note 2.3.1 to 2.3.8 are all related to the mitigations identified by OCEARCH themselves

### Other items in the Assessment document – ensure both docs are consistent

- 2.3.9. The total time of engagement with a single White Shark from the time it is initially hooked until it is released shall be limited to ## minutes.
- 2.3.10. No more than ## White Sharks, in total, shall be tagged.

.../4

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SARA Permit No. : DFO-MAR-2017-17

- 2.3.11. Only White Sharks between 13 and 18 feet in total length shall be caught and tagged.
- 2.3.12. A DFO Scientist shall be onboard as an observer throughout the duration of the expedition.
- 2.3.13. In the event of a mortality or significant injury being sustained by a White Shark during a tagging attempt, all further attempts at tagging shall cease and DFO shall be contacted immediately (insert appropriate contact info). No further attempts at catching or tagging White Sharks shall be resumed until approved by DFO.

**Commented [DF014]:** Need to check these sizes

**Commented [AG15]:** Change to "DFO representative" in case we can't get a scientist to go?

2.3.14. (This is currently seeking approval from the Animal Care plan from Jacksonville, so that that the approved plan is in place, should there be a condition related to this)

### 3. Conditions that relate to monitoring and reporting:

- 3.2. By January 31<sup>st</sup>, 2019, irrespective of whether the Permitted activities took place, a SARA Section 73 Permit Report shall be completed and returned to the Species at Risk Management Division using the contact information provided in condition 1.4. Without limiting the generality of the foregoing, the report shall contain the following information, to the satisfaction of DFO in its sole discretion:
- 3.2.1. to demonstrate that measures and standards to avoid and mitigate the impacts of the permitted activities on the species were implemented according to the conditions of this permit;
- 3.2.2. an assessment of whether the measures and standards mentioned in condition 3.2.1 were successful at avoiding and mitigating the impacts of the permitted activities on the species;
- 3.2.3. details of any contingency measures that were followed to prevent impacts greater than those authorized by this permit;
- 3.2.4. for any interaction with, or sighting of, a White Shark, report the following: date, time, location, length, size, gender (specify if females are pregnant or not), condition of the individual; and identify if tagging was attempted or undertaken on that individual; and
- 3.2.5. provide details of any tagging attempts, including whether tagging was successful, unplanned or unexpected impacts on the shark, reaction of the shark to the tagging, and lessons learned.

**Commented [DF018]:** From template but not in other MAR permits

**Commented [AG19]:** Good to include if there is a reporting requirement.

**Commented [AG20]:** This is redundant with 3.2.1. and 3.2.2. Suggest removing this.

**Commented [DF021]:** Template indicates this is required, but don't see this wording in other MAR permits

**Commented [DF022]:** In the template this refers to the same clause that the text included in? Not sure that's right, should it be referring to the clause before?

**Commented [DF023]:** Same comment as above

.../5

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SARA Permit No. : DFO-MAR-2017-17

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#### Authorization Limitations and Application Conditions

This permit cannot be transferred or assigned to another party. If the activity authorized under this permit is sold or transferred to another party, or if other circumstances arise that result in another party taking over the activity, the Permit Holder shall advise DFO in advance if the ownership or responsibility for the activity is expected to change.

The failure to comply with any condition of this permit is an offence under section 97 of SARA and might result in charges being laid under SARA.

This permit may be revoked or amended to ensure the survival or recovery of White Shark. Without limiting the generality of the foregoing, DFO may:

- suspend any permitted activities to avoid or mitigate additional adverse direct or indirect effects to White Sharks;
- amend or revoke this permit; and
- direct the Permit Holder to carry out at the Permit Holder's expense any modifications or actions deemed necessary by DFO to avoid or mitigate existing impacts or to avoid further adverse direct and indirect impacts to White Sharks.

This permit is valid only with activities and species listed herein and for no other purposes. It does not authorize the Permit Holder to [kill, capture, take, possess, collect, buy, sell, trade, damage the residence of, destroy the residence of, destroy part of the critical habitat of] *[Retain only those that apply]* an individual of a wildlife species that is listed as extirpated, endangered or threatened, or any part or derivative of such an individual. [This permit does not purport to release the Permit Holder from any obligation to obtain permission from or to comply with the requirements of any other regulatory agencies.]

**Commented [DF024]:** This sentence is from the national template but not included in other MAR permits

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Date of Issue: Month/Day/Year

Signature of authorizing officer: \_\_\_\_\_

Donald Humphrey  
Manager, Species at Risk Management Division  
Maritimes Region  
Fisheries and Oceans Canada  
1 Challenger Drive, P.O. Box 1006, Dartmouth, NS, B2Y 4A2

Further information about this permit is available from the above authorizing officer ([Donald.Humphrey@dfo-mpo.gc.ca](mailto:Donald.Humphrey@dfo-mpo.gc.ca)).

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Fisheries and Oceans  
Canada

Pêches et Océans  
Canada

FILE NO: DFO-MAR-2017-17  
17-PNFL-00020

**Ecosystem Management – Assessment and Approval of  
Species at Risk Act (SARA) Section 73 Permit Application**

**1. APPLICANT INFORMATION**

Permit Renewal? ☐ Yes ☒ No  
Permit Amendment? ☐ Yes ☒ No  
Is this a multi-year permit application? ☐ Yes ☒ No  
If so, what is the starting year and ending year:  
Previous Permit Number(s): n/a

**Individual(s) or Organization to appear as the Licensee on the Permit**

Name: OCEARCH  
Contact: George Christopher Fischer  
Email: chris@oceanarch.org  
Address: 1790 Bonanza Drive, Suite 101B  
Park City, Utah, USA 84060  
Phone: 435-645-8990

The following individuals and those under their direct supervision may undertake the activities authorized by the permit:

Name	Organization

**2. ACTIVITIES INFORMATION**

a) **Listed Species Affected:** White Shark (*Carcharodon carcharias*), Atlantic population - Endangered

**b) Project Summary:**

OCEARCH is proposing to conduct scientific research on White Sharks in Canadian waters to provide information in relation to a number of questions, including understanding the role of coastal waters off Nova Scotia and Newfoundland in the life history of the White Shark population, the range of the White Shark population in the northwest Atlantic, the health of White Sharks inhabiting Canadian waters, and adaptations of White Sharks for northwest Atlantic waters.

OCEARCH is proposing to conduct a research expedition in Canadian waters in September/October 2018, involving a collaborative team of scientists who will be onboard and collecting data to support a number of research projects. Sharks will be caught and guided to a research platform on the M/V OCEARCH. Research procedures (sampling and tagging) will be carried out on board the vessel, following which the animals will be released live. OCEARCH has requested a permit to tag 20 sharks in Canadian waters based on their analysis that 60 sharks are required for their various research studies (20 young-of-the-year, 20 immature and 20 mature); to date OCEARCH has tagged 33 sharks in the north Atlantic.

Canada

**Actively attracting White Sharks to the fishing boat and the larger research vessel** will be carried out by placing chum in the water using a variety of techniques. Observers on board the vessel scan for signs of White Shark activity and OCEARCH also makes use of drones, to search for White Sharks. To attract sharks, a combination of chum bags, chum boxes, bait tanks, chum tubes and decoys are used. The chum consists of whale blubber and oil, mackerel and tuna, and/or menhaden oil. OCEARCH will seek a marine mammal permit from DFO to authorize the use of marine mammal material in Canadian waters.

**White Sharks will be caught** from the fishing boat using a circle hook (20/0 or 27/0 with zero offset). The hooks will be rigged with a crossbar bite-blocker (30cm up the leader) to prevent the shark from swallowing the bait. The hook will be attached to stainless steel wire rope (3/32" or 1/8"); the leader is about 10m and will be attached to a braid rope with elasticity properties to reduce hard shock when the initial struggle ensues. Typically within 5-10 minutes of being caught, the White Shark is guided onto the hydraulic lift on the research vessel.

**White Sharks will be lifted out of the water** on a hydraulic lift that is lowered off the research vessel. The lift, which includes side guides and an end gate to prevent the shark from swimming off, will be lowered below the waterline and the shark guided on. The lift will then be slowly raised above the water. Once on the lift, the hook will be removed from the shark's jaw. The shark will be on its side for the initial 5-7 minutes (to take blood samples, implant the acoustic tag, perform ultrasound) then it is rolled to an upright position (to attach satellite tag). Other procedures undertaken while the White Shark is on the lift will be the collection of swabs (skin mucus, gill surface and cloacal swabs); collection of parasites, collection of semen, fecal, and muscle samples, as well as possibly urine samples if the animal urinates while on deck, and the collection of eye and tail measurements.

**Commented [AG1]:** Maybe make a note in this section about flushing water over the gills to enable breathing.

**Blood and tissue sampling** will be conducted while White Shark are onboard the vessel. A hypodermic puncture and biopsy punch will be used to obtain blood (<25ml), muscle (<5g), semen, and skin mucus samples.

**Implantation of internal acoustic tags** will be conducted by making a surgical incision to insert a sterilized transmitter (1cm x 6cm) into the coelomic cavity. The incision will be sutured and the sutures will be absorbed over a period of time. OCEARCH is proposing to insert the internal acoustic tags in every White Shark (up to 20) caught in Canadian waters under this permit application.

**Attachment of satellite tags** will be conducted by drilling and bolting Smart Position or Temperature (SPOT) tags on the leading edge of the first dorsal fin. The SPOT tags (Wildlife Computers Model SPOT-257) measure 162 x 57 x 20 mm and weigh 160 g. To attach the tag, four holes are drilled in the dorsal fin with an electric drill (drill bit will be cleaned and sterilized in alcohol before use). The tag will be attached with alcohol-sterilized nylon bolts, stainless locknuts and plastic spacers (standard hardware from the tag manufacturer). Tags will be coated with an antifouling compound. The hardware is designed to retain the tag for five years, after which it will fail and the tag will detach. OCEARCH is proposing to attach a SPOT tag to every White Shark (up to 20) caught in Canadian waters under this permit application.

Pop-up Satellite Archival Tags (PSAT) will be attached via a tether to a subdermal metal dart implanted in the shark's flank below the first dorsal fin. PSAT tags are provided to OCEARCH by a collaborator at the Woods Hole Oceanographic Institution. The number of tags has not been confirmed, but will likely be 4-6 tags. The PSAT tags will be attached, in addition to acoustic and SPOT tags, on 4-6 White Sharks.

OCEARCH is also potentially looking to use a prototype tag that is a combination of a PSAT and SPOT tag. The tag is attached via a darted tether in the same way as a PSAT tag. If these new prototype tags are available, they will be used instead of the PSAT tag on 4-6 White Sharks. As these are prototype tags, OCEARCH is proposing to use these tags in combination with the SPOT tags to validate the new tag's geolocation data.

**c) Analysis of Proposed Activities:**

<b>Location:</b> Atlantic Ocean				
Coastal Nova Scotia:				
<ul style="list-style-type: none"> <li>• Mahone Bay (44° 29.50' N / 64° 13.50' W and adjacent areas</li> <li>• Bay of Fundy (44° 54.00' N / 66° 32.50' W and adjacent areas</li> </ul>				
South Coast of Newfoundland:				
<ul style="list-style-type: none"> <li>• Placentia Bay (47° 05.00' N / 54° 32.00' W</li> </ul>				
Sable Island (43° 56.14' N / 59° 56.59' W)				
<b>Dates:</b> September 18-October 11, 2018				
Proposed Activity	Planned Effects/Outcome		Potential Incidental Effects/Outcome	
	Prohibitions that Apply	Likelihood of the prohibited impact(s)	Prohibitions that Apply	Likelihood of the prohibited impact(s)
Actively attracting White Sharks to a vessel (i.e., chumming)	Harass	Med	Harm Kill	Low Low
Capture of White Sharks	Harass Harm Capture	High Low High	Kill	Low
Lifting White Sharks out of the water	Harass Harm Capture	High Low High	Kill	Low
Blood and tissue sampling	Harass Possess	Med High	Harm	Low
Implantation of internal acoustic tags	Harass Harm	Med Low	Kill	Low
Attachment of satellite tags -- SPOT tags	Harass Harm	Med Low	Kill	Low
Attachment of satellite tags -- PSAT tags	Harass Harm	Med Low	Kill	Low

**Commented [AG2]:** Does tissue sampling cause harm?

Impacts to individual White Sharks would result from any distress associated with the approaching vessel, being caught and brought onboard the vessel and out of the water, the application of the different tag types and the collection of biological samples.

**Actively attracting White Sharks to a vessel (i.e., chumming)**

A number of studies suggest that the presence of chum may be linked to modification of White Sharks' normal swimming and/or hunting behaviours, although the effects are likely short term when chum is used for short term research projects.<sup>1</sup> It is possible that attracting a White Shark will cause the individual to stray from patrolling for food or from mating. Disturbance to normal feeding behaviours may result in energetic costs.<sup>2</sup>

There is a possibility that attracting sharks to the fishing boat or the research vessel may result in collisions between the shark and the vessel and that the presence of the vessel may cause behavioural changes.

<sup>1</sup> NOAA. 2014. Draft Programmatic Environmental Assessment of Potential White Shark Research and Education Projects within the Gulf of the Farallones and Monterey Bay National Marine Sanctuaries. [https://nrmssanctuaries.blob.core.windows.net/sanctuaries-prod/media/archive/library/pdfs/gfrms\\_draft\\_white\\_shark.pdf](https://nrmssanctuaries.blob.core.windows.net/sanctuaries-prod/media/archive/library/pdfs/gfrms_draft_white_shark.pdf)

<sup>2</sup> Semmens, J.M., Payne, N.L., Huveneers, C., Sims, D.W. & Bruce, B.D. 2013. Feeding requirements of White Sharks may be higher than originally thought. Sci. Rep. 3, 1471; DOI:10.1038/srep01471 (2013).

### **Catch of White Sharks**

Catch and release fishing is a source of stress to White Sharks due to the potential for long fight times (exhausting the individuals) and injury from wounds caused by the hooks. Long capture times have been known to kill bony fish and other sharks.<sup>3</sup> Physiological disruptions to fish result from the high anaerobic activity, muscle fatigue and time spent out of water caused by capture using most fishing techniques.<sup>4</sup>

Injury can result from the wound caused by the hook, although the extent of the tissue damage or injury will depend on the location of the hook and the type of gear. Sub-lethal injury can result from removing hooks or leaving them in place in the throat, esophagus or gut. In the short term, a hook in the mouth will cause a loss of blood, but the wound would be expected to heal within a year or less. Circle hooks are known to cause lower incidences of internal injury than conventional J hooks.<sup>5</sup>

Although not specific to White Shark, a study in Australia examined post release survival in Shortfin Mako by attracting individuals to a boat using chum, then using monofilament line and either J hooks or circle hooks to catch the sharks. The study showed that the length of the fight time did not impact survival. Circle hooks significantly reduced foul hooking. The study showed that hook choice affected the likelihood of mortality, while the species' is able to cope with long fight times and associated physiological responses to capture due to its endothermy and high aerobic scope.<sup>6</sup>

It has been suggested that sharks, in general, are capable of recovery from physiological stress associated with capture and that any mortality is more likely linked to the extent of any physical injuries.<sup>7</sup>

### **Lifting White Sharks out of the water**

The research platform is raised and the White Sharks are lifted from their natural, in-water environment. This removal from the water likely results in physiological stress and possible oxygen deprivation.

Lifting White Sharks out of the water, onto a hard raised platform, may create excessive pressure on tissues and organs that usually do not bear weight. This impact may be greater in larger individuals.

While there are concerns about damage to internal organs, there is no evidence reported of internal organs being crushed when sharks are removed from the water.<sup>8</sup> However, if sharks are thrashing on the deck, this could lead to internal injuries.

OCEARCH has taken blood samples in the first minute and the last minute on the lift for 120 White Sharks handled in this manner and found stress levels remain relatively low throughout the handling time. Higher amounts of stress due to capture were shown in very young White Sharks (however OCEARCH is not proposing to catch young sharks in Canadian waters).

### **Blood and tissue sampling**

The *Canadian Council on Animal Care Guidelines on Care and Use of Fish in Research* suggest that blood samples be up to 1ml/kg body size. The volume proposed to be collected by this project is well under this recommended amount.

The retention of the blood and tissue samples involves possession of parts of individuals.

### **Implantation of internal acoustic tags**

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<sup>3</sup> NOAA 2014

<sup>4</sup> Skomal, G.B. 2007. Evaluating the physiological and physical consequences of capture on post-release survivorship in large pelagic fishes. *Fisheries Management and Ecology*. 14: 81-89.

<sup>5</sup> NOAA 2014

<sup>6</sup> French R.P., Lyle J., Tracey S., Currie S., Semmens J.M. 2015. High survivorship after catch-and-release fishing suggests physiological resilience in the endothermic shortfin mako shark (*Isurus oxyrinchus*). *Conserv Physiol* 3: doi.10.1093/conphys/cov044

<sup>7</sup> Skomal 2007

<sup>8</sup> NOAA 2014

Implanting internal acoustic tags requires making a surgical incision, from which there could be a risk of infection or causing harm to the individual.

#### **Attachment of satellite tags (SPOT and PSAT)**

In terms of physical injury associated with the tagging, shark species in general are very resilient to superficial cuts and have a tremendous capacity to heal from injury.<sup>9</sup> Similar and much more extensive lacerations occur frequently during mating behaviours, and one of the identifying characteristics of a mature female shark is deep scarring along her dorsal musculature. The tagging site is expected to close over very quickly with minimal effect on the animal, as has been observed in other species held in captivity after tagging.

Various studies have examined possible longer term effects of electronic tags or data loggers on the swimming efficiency of sharks, but results have been variable.<sup>10</sup> There may be a marginally increased drag while swimming due to the external tag.

A study from South Africa suggests that SPOT tags can cause permanent cosmetic and structural damage to the dorsal fins of White Sharks, depending on how long the tag is attached for. Tags that detach within 12-24 months did not seem to cause long term damage; while after 24 months permanent damage to the dorsal fin was ~~reports~~reported. However, the study did not show that the damage to the dorsal fin resulted in impacts to long term survival or body growth.<sup>11</sup>

Research from Monterey Bay Aquarium also showed that real-time satellite tags attached with multiple bolts on juvenile White Sharks affects the growth of the dorsal fin (growing around the tag or causing a deflection to the tip of the fin). They suggested that there may be more of a reaction to the presence of the bolts and tag in growing tissue.<sup>12</sup>

OCEARCH has provided photographs of White Sharks observed years after tagging that show that the fins have healed and are functioning properly.

#### **Post Release Behaviour and Longer Term Effects**

Results from research in which White Sharks were caught and restrained using an in-water stretcher and then tagged, has shown a six to 48-hour recovery period for individuals after capture and tagging.<sup>13</sup>

Post-release behavioural studies by OCEARCH collaborating scientists using accelerometers attached to the sharks have shown recovery and resumption of natural swimming behaviour within approximately 6 hours after release.

Research conducted off the west coast of California that involved tagging 21 White Sharks (2007-2012), found that they resumed 'normal' behaviours after tagging, as determined by their migration patterns. These sharks were tagged with SPOT tags (using various methodology including being lifted onto a platform out of the water and being tagged while alongside the research boat).<sup>14</sup>

It has been suggested that catch and release of marine pelagic fish may have sublethal population level effects due to reduced individual fitness. However, as these population level effects are difficult to assess in highly migratory species with poorly understood life histories, this has not been quantified or ~~studies~~studied in depth.<sup>15</sup>

<sup>9</sup> NOAA 2014

<sup>10</sup> Hammerschlag, N., 2011. A review of shark satellite tagging studies. J. Exp. Mar. Biol. Ecol. doi:10.1016/j.jembe.2010.12.012

<sup>11</sup> Jewell O.J.D., Wcisel M.A., Gennari E., Towner A.V., Bester M.N. 2011. Effects of Smart Position Only (SPOT) Tag Deployment on White Sharks Carcharodon carcharias in South Africa. PLoS ONE 6(11): e27242. doi:10.1371/journal.pone.0027242

<sup>12</sup> NOAA 2014

<sup>13</sup> NOAA 2014

<sup>14</sup> NOAA 2014

<sup>15</sup> Skomal 2007

As little is known about White Shark mating behaviour, it is unknown whether tagging could have an impact on mating.<sup>16</sup>

There is anecdotal evidence of at least one White Shark having died following interactions with OCEARCH using the methods proposed here.

#### Summary

Based on the above assessment, the following activities have the potential to contravene the SARA prohibitions and therefore must be authorized under SARA:

- Actively attracting White Sharks to a vessel;
- Catching White Sharks and lifting individuals out of the water on a hydraulic lift;
- Collecting biological samples from White Sharks;
- Implanting internal acoustic tags; and
- Attaching SPOT and PSAT tags to White Sharks.

The effects that these activities may cause to White Sharks include:

- Capture and harassment of, and potentially harm to, individuals,
- Possession of samples from individuals, and
- Although unlikely, killing of, individuals.

The Species at Risk Management Division has concluded that the activities associated with the above project are likely to affect the **White Shark, Atlantic population**, in a manner that is prohibited by SARA, and therefore a SARA Section 73 permit is considered necessary to engage in the proposed activities.

### 3. REGULATORY ASSESSMENT OF APPLICATION

#### Necessity Assessment

Work through the following five questions to determine the appropriate action for DFO to take in response to the permit application.

1. Is it likely that one or more species listed on Schedule 1 of the SARA occurs at any of the locations identified for the proposed activities?

☒ Yes ..... Go to next question  
☐ No .....

**A SARA permit is not necessary. The applicant will be informed in writing and advised to ensure any other required authorizations are obtained before proceeding with the activities. Go to Assessment Summary.**

2. Are any of the SARA-listed species concerned considered an "Aquatic Species" as per the definition in the *Fisheries Act*?

☒ Yes ..... Go to next question  
☐ No .....

**The applicant will be directed to resubmit the application to the appropriate agency. Go to Assessment Summary.**

3. Are the locations at which any of the activities are proposed to take place under the jurisdiction of Fisheries and Oceans Canada?

☒ Yes ..... Go to next question  
☐ No .....

<sup>16</sup> NOAA 2014

The applicant will be directed to resubmit application to the appropriate agency. Go to Assessment Summary.

4. Is it certain or likely that performing any of the proposed activities will affect the SARA-listed species concerned in a way to contravene the general prohibitions of SARA (subsections 32(1), 32(2), section 33, subsections 36(1), 58(1), 60(1) and 61(1))?

☒ Yes .....Go to next question  
☐ No .....

A SARA permit is not necessary. The applicant will be advised of this in writing. Go to Assessment Summary.

5. Do any of the exceptions listed in SARA Section 83 apply to the proposed activities concerned?

☐ Yes .....

A SARA permit is not necessary. The applicant will be advised of this in writing and the basis on which an exception applies will be described here. Go to Assessment Summary.

☒ No .....  
A SARA Section 73 permit is required to avoid contravention of the prohibitions of SARA. DFO will proceed with the application to assess eligibility. Go to Eligibility Assessment.

**Commented [JM3]:** s 83(5d): Subsection 32(2) does not apply to a person who possesses an individual of a listed species or any part of an individual if the person acquired it by succession from someone who was entitled to possess it under this Act.

-other review forms have listed all those that will receive/possess samples

#### Eligibility Assessment

The following two questions assess whether the proposed activities are eligible for a SARA Section 73 permit.

1. Section 73(2): The purpose of the proposed activities is described by **one or more** of the following:

- ☒ The activity is scientific research relating to the conservation of SARA-listed species and will be conducted by qualified persons
- ☐ The activity benefits the species or is required to enhance its chance of survival in the wild.
- ☐ Affecting the SARA-listed species is incidental to carrying out the activity

The proposed activities aim to answer a number of research questions, both through the tracking of individual White Sharks that will be tagged and through analysis on blood and other tissue samples.

The draft Recovery Strategy for White Shark identifies the following as high priority research and management approaches:

- undertake scientific research to better understand population dynamics, distribution and habitat use.
- collect and maintain White Shark sightings information; maintain this information in a database and share via network

Qualified persons – need confirmation of the expedition leader

☒ Yes .....Go to next question

☐ No .....

The proposed activities are not eligible for a SARA Section 73 Permit. Go to Assessment Summary.

2. Section 73(3): The proposed activities meet **all** of the following pre-conditions:

- ☐ All reasonable alternatives to the activity that would reduce the impact on the species have been considered and the best solution has been adopted

In the consideration of alternatives to the proposed research, there are a number of alternatives that should be considered. The first alternative to consider would be to not undertake the activity and not conduct the research; however, given the many unknowns about the species this would not represent the best solution as it would be a loss of an opportunity to learn more.

There are no alternative locations to conduct the research, as it must be conducted within the range of the species.

In relation to the proposed activities, overall the applicant asserts that the methods and procedures proposed are the safest and most successful way of obtaining the necessary samples and attaching SPOT tags.

#### Attracting and Catching White Shark

- The alternative to chumming for White Shark is to not use chum, which would limit the ability to sight White Sharks to passive observations. Given the low numbers in a large area, chance encounters would be low, which would reduce or even eliminate the success rate of researchers attempting to deploy tags or obtain samples.

#### Catching, restraining and lifting the shark out of the water

- Alternative approaches include (1) attracting a shark and sampling/tagging it without restraining or catching it and (2) attracting a shark and catching it, but conducting sampling/attaching tags while the shark remains in the water.
- The following summarizes the type of tagging and sampling that is possible under each alternative:

	(1) No Capture	(2) Capture and Tag in Water	(3) Capture and Use of Lift
Tag Types	PSAT Acoustic (external)	SPOT PSAT Acoustic (external)	SPOT PSAT Acoustic (internal or external)
Other Samples	<ul style="list-style-type: none"> <li>muscle samples</li> </ul>	<ul style="list-style-type: none"> <li>blood samples</li> <li>swabs (skin mucus)</li> <li>muscle samples</li> </ul>	<ul style="list-style-type: none"> <li>blood samples</li> <li>swabs (skin mucus, gill surface and cloacal swabs)</li> <li>muscle samples</li> <li>parasite samples</li> <li>semen samples</li> <li>fecal samples</li> <li>urine samples (opportunistic)</li> <li>eye/tail measurements</li> <li>ultrasound</li> </ul>

- Under alternative (1), the success rate for tagging and collecting samples would likely be less than using one of the alternative methodologies, which involve catching the sharks.
- Under alternative (2), some researchers have suggested that keeping the shark in the water reduces the stress experienced by the shark as a result of being lifted from the water. However, OCEARCH has indicated that sharks are more likely to struggle if they remain in the water, while being on the lift quiets the animals and therefore they conclude that the proposed method reduces the potential for harm to the sharks.
- With respect to the precise methodology proposed to capture sharks, the approaches proposed likely present the best alternative to reduce potential impacts. Alternatives would be to use a 'J' hook instead of a circle hook, to not use the bite blocker, to not embed the leaders in rope. However, all of these alternatives would increase the risk of internal (e.g., gut-hooking) or external (e.g., lacerations) injury to the sharks.

#### Blood and tissue sampling



- An alternative method to collecting biological samples, would be collect samples by harpoon, while the shark remains in the water. However, the collection of blood samples, swabs of the skin mucus, gill surface and cloacal, parasite collection and semen samples require catching and controlling the animal. Further, attempting to obtain samples in the water increases the risk of sample contamination, loss of sample and infections in the shark.

#### Tagging

- SPOT, PSAT and acoustic tags all collect different types of data:
  - SPOT tags transmit location and other data in real time. Information is transmitted while the tag is attached to the shark; the data signal from these tags is sent when the shark's dorsal fin is at the surface. SPOT tags may transmit data for up to 3-5 years. To obtain real-time geolocation data from an animal that is wide ranging within areas that are previously unknown, SPOT tags provide the best option for collecting this data.
  - Data from PSAT tags is stored on the device and retrieved after the tag detaches from the shark. PSAT tags will collect data for approximately one year. PSAT tags provide archived temperature and depth data, but the geolocation data is less precise and not available in real-time.
  - Acoustic tags are useful to detect the arrival of an animal in an area where underwater acoustic receivers have been deployed (typically well-studied inshore areas).
- OCEARCH has indicated that to understand an animal's large scale movements and migration, SPOT tags are the most effective in revealing the precise tracks and this data, in their perspective, cannot be substituted with data from PSAT or acoustic tags. Further, the real time data from SPOT tags support their educational and outreach objectives.
- There are alternative attachment methodologies for tags:
  - Acoustic tags can be attached externally rather than internally. OCEARCH indicated concerns with the risk that external tags can be shed. However, other researchers have successfully utilized externally attached acoustic tags.
  - SPOT tags can also be attached as floating tags, however OCEARCH indicated concern that floating SPOT tags can be fouled, shed and lost from the animal very rapidly.
  - Other researchers have developed a technique to attach SPOT tags with a single bolt, rather than the four bolt attachment methodology proposed by OCEARCH.

- ☐ All feasible measures will be taken to minimize the impact of the activity on the species or its critical habitat or the residence of its individuals

The following measures were proposed by OCEARCH to minimize the impacts of the activities:

- individuals will not be chased by the vessel, but will be attracted using chum;
- gear will be used that will minimize the chance that animals are gut-hooked (including using circle hooks and a crossbar bite-blocker);
- animal struggles and injury will be minimized by:
  - using a leader attached to a braid rope with elasticity properties to help reduce hard shock during the initial struggle;
  - using a 10m leader length in case the shark rolls in the line to ensure that the shark cannot bite through the rope and escape (retaining the hook and leader);
  - embedding the leader inside a three-strand rope to give it a thicker diameter so that if the shark rolls, the thicker rope does not cut into the sharks' skin and is easier to unwrap;
  - using heavier tackle that keeps enough pressure on the shark so that the line is stretched tight and the shark cannot turn and roll.
- all research procedures will be conducted within 20 minutes;
- while on the research platform:
  - oxygenated seawater will be pumped through a hose and mouthpiece (allowing for simultaneous flushing of the gills on both sides of the head) into the shark's buccal cavity at all times;
  - a tail rope will be used to prevent the animal from causing harm to itself and others;

- o the head and eyes will be covered with wet terrycloth towel to reduce stress and keep eyes moist;
- o skin will be kept wet during in-air procedures to prevent drying;
- o animal stress will be monitored by observing skin colouration, presence of blood pooling, gill movements, and animal activity:
  - if stress is detected in the animal, a blood sample will be taken to evaluate the shark's conditions;
  - if acute stress is observed, the animal will be released immediately.
- OCEARCH is currently seeking approval of their animal care plan from Jacksonville University and will notify DFO once that the approved plan is in place.

In addition, the permit will require that:

- the total time of engagement with a single White Shark be limited to (from the time it is initially hooked until it is released);
- a maximum number of White Sharks can be tagged;
- only White Sharks between 13 and 18 feet in total length can be caught and tagged;
- a DFO Scientist must be onboard throughout the duration of the expedition;
- work will cease and DFO will be contacted immediately if there is any mortality of a White Shark or if a White Shark receives any significant injury and no further attempts at catching or tagging White Sharks will be resumed until approved by DFO;
- all interactions with White Sharks (including location of capture/tagging events; number and gender/age of all White Sharks caught and tagged) and all mitigation measures employed will be reported to DFO.

☒ The activity will not jeopardize the survival or recovery of the species

Tagging of White Sharks is unlikely to jeopardize the survival or recovery of the population. The recovery goal in the draft recovery strategy is to: "Maintain or increase the population of White Sharks that frequent Atlantic Canadian waters." No mortality is expected as a result of the activities, and therefore recovery will not be compromised. Even in the very unlikely event that mortality occurs during the activities, Science advice indicates that the population of White Sharks in the NW Atlantic is increasing and current mortality levels (due to incidental capture in fisheries) would have to increase substantially before population trajectories would be predicted to decline. Therefore there is a high likelihood that recovery goals can be achieved under various scenarios of allowable harm for White Shark, even if annual bycatch mortality increases from historical estimates.<sup>17</sup>

☐ Yes ..... Go to Consultation Assessment  
☐ No .....

The proposed activities are not eligible for a SARA Section 73 Permit. Go to Assessment Summary.

#### Consultation Assessment

The following two questions assess whether consultation with an outside party is required before issuing a SARA Section 73 Permit for the proposed activities:

<sup>17</sup> DFO. 2017. Evaluation of Scope for Harm for White Shark (*Carcharodon carcharias*) in Atlantic Canada. DFO Can. Sci. Advis. Sec. Sci. Resp. 2017/025.

**Commented [DFO6]:** The following needs discussion with Science and likely with OCEARCH to confirm agreement with these conditions

**Commented [DFO9]:** Need to check these sizes

**Commented [AG10]:** Or "observer" in case we can't get a scientist?

**Commented [DFO11]:** Would need to confirm 1) who would at DFO would be contacted? a

**Commented [AG12]:** Also, they should report any unsuccessful attempts in which white sharks were observed but not caught and/or tagged. Would be good to get as much info as possible about any sightings: location, length estimate, gender (if visible), weight, other info...

1. **Section 73(4):** Do the proposed activities concern a species in an area in respect of which a wildlife management board is authorized by a land claims agreement to perform functions in respect of wildlife species?

☐ Yes ..... **Go to Assessment Summary**  
☒ No ..... **Go to next question**

2. **Section 74(5):** Do the proposed activities concern a species in a reserve or any other lands that are set apart for the use and benefit of a band under the Indian Act?

☐ Yes ..... **Go to Assessment Summary**  
☒ No ..... **Go to Assessment Summary**

#### **Assessment Summary**

The above assessment is summarized below. In order to recommend that a SARA Section 73 Permit be issued for the proposed activities, the above assessment must demonstrate that doing so is warranted, lawful, and if applicable, that all consultation requirements of SARA s. 73(4) or 73(5) have been fulfilled. [highlight in red text the selected responses]

1. The proposed activities warrant the need for a SARA Section 73 Permit.

☒ Yes ..... **Go to next question**  
☐ No .....

**A SARA permit is not necessary. The applicant will be advised of this in writing. Go to EM Permit Decision.**

2. The proposed activities are consistent with all of the eligibility requirements of SARA Section 73.

☐ Yes ..... **Go to next question**  
☐ No .....

**The proposed activities are not eligible for a SARA s.73 Permit. Go to EM Permit Decision.**

3. The permit decision, proposed activities, and any permit contents require consultation with an outside party.

☐ Yes .....  
**Undergo consultation with the appropriate party before proceeding further in the permitting process.**

☒ No .....  
**Issue a SARA s.73 Permit. Go to Ecosystem Management Permit Decision.**

#### **4. REVIEW**

Input sought from:

Name	DFO Sector

#### **5. ECOSYSTEM MANAGEMENT PERMIT DECISION**

☐ **A SARA Section 73 Permit is not considered necessary to engage in the proposed activities.**

☐ **Issue SARA Section 73 Permit** subject to the conditions outlined in the SARA Section 73 Permit for DFO-MAR-20###-##.

☐ Do not issue Section 73 Permit.

**6. SIGN-OFF**

**Reviewed by:**

\_\_\_\_\_  
Donald Humphrey  
Regional Manager  
Species at Risk Management Division (Maritimes  
Region)

\_\_\_\_\_  
Date

\_\_\_\_\_  
Katrina Sullivan  
Regional Manager  
Species at Risk Management Division (Newfoundland  
and Labrador Region)

\_\_\_\_\_  
Date

## MacDonald, Jennifer

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**From:** Chris Fischer <chris@oceanarch.org>  
**Sent:** March-08-18 10:35 AM  
**To:** MacDonald, Jennifer  
**Cc:** Robert Hueter; Bowlby, Heather; [REDACTED] Danielle Pernette;  
Bryan Franks; Fernanda Ubatuba  
**Subject:** Re: Further information on OCEARCH methodology

We are not planning on lavaging sharks if we are granted a Canadian permit unless that was something DFO requested as an added layer of science.

Grateful for all,

Chris

[REDACTED]

Chris Fischer

Founding Chairman

Oceanarch

[www.Oceanarch.org](http://www.Oceanarch.org)

On Mar 8, 2018, at 9:19 AM, MacDonald, Jennifer <[Jennifer.MacDonald@dfo-mpo.gc.ca](mailto:Jennifer.MacDonald@dfo-mpo.gc.ca)> wrote:

Hi Bob,

Thank you very much for providing this additional information. I appreciate your comparison of the methodologies, as that is helpful in our evaluation of alternatives. I did have a couple of follow-up questions I wondered if you could answer.

In the table, you compared using the OCEARCH platform (which requires capture and lifting the sharks from the water) to Non-Capture Harpooning methods. Could you also speak to any methodology that can be employed in which sharks are caught, but not removed from the water (i.e., sharks are held alongside a boat and tagged in water). Does OCEARCH have any experience in utilizing this methodology?

I also noted that you include gastric lavage in the table; this was not included as one of the proposed activities in your permit application. I note that in the table you indicated that this not a standard procedure, so I want to confirm that you do not plan to undertake this activity as part of the proposed expedition in Canadian waters this summer?

Thank you,

Jenn

**Jennifer MacDonald**  
Species at Risk Management Division  
(902) 407-8175

s.19(1)

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**From:** Robert Hueter [<mailto:rhoeter@mote.org>]  
**Sent:** March-05-18 1:20 PM  
**To:** MacDonald, Jennifer  
**Cc:** Bowlby, Heather; Chris Fischer; [REDACTED] Danielle Pernette; Bryan Franks; Fernanda Ubatuba  
**Subject:** Further information on OCEARCH methodology

My apologies if this is a repeat message, I'm experiencing some problems with my computer and I'm not sure my first attempt went through --

Hi Jenn:

In conversations we've had with one of our Canadian NGO partners (Coastal Action), it was brought to our attention that questions are still being raised about the need for OCEARCH's methodology for studying large sharks. More specifically, that everything we are doing can be done with non-capture methods such as being used by the Division of Marine Fisheries in Massachusetts. Nothing could be further from the truth, and to illustrate that, I put together the attached table comparing the two types of methodologies for your information.

In reviewing our SARA permit application please keep in mind that NOAA has closely scrutinized all of OCEARCH's methods and has issued us federal permits for our work in U.S. waters.

I'm including copies of our application and our document providing further requested information, for the benefit of the others on this email.

We look forward to discussing our request with you soon, and we hope to work with any and all DFO scientists who wish to take advantage of the opportunities OCEARCH presents for studies of these large sharks in Canadian waters.

Best regards,

Bob

--

**ROBERT E. HUETER, Ph.D.**

*Senior Scientist & Director, Center for Shark Research  
Perry W. Gilbert Chair in Shark Research  
Manager, Sharks & Rays Conservation Research Program  
Mote Marine Laboratory  
1600 Ken Thompson Parkway  
Sarasota, FL 34236 USA*

*Chief Science Advisor*

OCEARCH

[rhuetter@mote.org](mailto:rhuetter@mote.org)

Tel: 941-388-1827

Fax: 941-388-4312

More info at: [www.mote.org](http://www.mote.org)

No information has been removed or severed from this page

**MacDonald, Jennifer**

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**From:** Robert Hueter <rhuetter@mote.org>  
**Sent:** March-08-18 11:21 AM  
**To:** MacDonald, Jennifer  
**Cc:** Bowlby, Heather; Chris Fischer; [REDACTED] Danielle Pernette; Bryan Franks; Fernanda Ubatuba  
**Subject:** Re: Further information on OCEARCH methodology

Hi Jenn:

As Chris just said, we have no plans to conduct gastric lavage on the sharks in Canadian waters, I simply listed this as a possible procedure on the OCEARCH platform that is not possible with other methods.

As for an alongside-boat method, yes we have lots of experience with that, collectively as shark researchers working on a wide variety of species over decades of time. It is difficult work that requires calm sea conditions and the right size and behavior of animal. We have found that sharks struggle while still in the water, attempting to get away and thus building up lactic acid and going into a stressful state, requiring them to be restrained with a hooked leader, tail rope, and sometimes other gear. This all takes time and can add to the animal's stress and physical damage. Sharks on the lift, on the other hand, acquiesce quickly and do not struggle, keeping their stress levels low while they are ventilated with seawater. This has been shown with physiological studies.

In the water, under perfect conditions, it is possible to get more accurate morphometrics, take a fin clip and some muscle biopsy samples, and attach a SPOT tag if the shark cooperates. I emphasize that conditions must be perfect to do this effectively, and those conditions seldom occur. The rest of the methods on the chart really aren't effectively done in the water, except on small animals that can be manipulated to get the necessary samples. That manipulation again adds to the handling time and stress level. Big problems with contamination of samples can occur in the water. Working over the side of a small boat on a big animal, furthermore, carries increased risks to the safety of the personnel, as opposed to the platform method, which is very safe for the researchers and fishing crew.

In short, our platform method is easier on the animal, much more productive for science, and safer for the people involved, and the post-release satellite tracks demonstrate that the large white sharks swim away and resume normal activities almost immediately. To that point -- you might see some mention in online newspaper articles by the Massachusetts group that OCEARCH-tagged sharks "immediately" leave the study site in some sort of unusual way. This has been proven to be untrue. Our satellite tracks (available to all online at [oearch.org](http://oearch.org)) show that our sharks do not leave the area with any greater frequency than the Massachusetts harpoon-tagged animals. One other item about the harpoon method that I didn't mention on the chart: this requires chasing the sharks in a small to mid-sized boat. Chasing can increase the stress levels of those animals, depending on how long it takes to attach the tags.

I hope that answers your questions. Please feel free to request further information. Looking forward to talking soon.

Bob

**ROBERT E. HUETER, Ph.D.**

*Senior Scientist & Director, Center for Shark Research  
 Perry W. Gilbert Chair in Shark Research  
 Manager, Sharks & Rays Conservation Research Program  
 Mote Marine Laboratory  
 1600 Ken Thompson Parkway  
 Sarasota, FL 34236 USA*



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Fax: 941-388-4312  
More info at: [www.mote.org](http://www.mote.org)

On 3/8/2018 9:19 AM, MacDonald, Jennifer wrote:

Hi Bob,

Thank you very much for providing this additional information. I appreciate your comparison of the methodologies, as that is helpful in our evaluation of alternatives. I did have a couple of follow-up questions I wondered if you could answer.

In the table, you compared using the OCEARCH platform (which requires capture and lifting the sharks from the water) to Non-Capture Harpooning methods. Could you also speak to any methodology that can be employed in which sharks are caught, but not removed from the water (i.e., sharks are held alongside a boat and tagged in water). Does OCEARCH have any experience in utilizing this methodology?

I also noted that you include gastric lavage in the table; this was not included as one of the proposed activities in your permit application. I note that in the table you indicated that this not a standard procedure, so I want to confirm that you do not plan to undertake this activity as part of the proposed expedition in Canadian waters this summer?

Thank you,

Jenn

**Jennifer MacDonald**  
Species at Risk Management Division  
(902) 407-8175

---

**From:** Robert Hueter [<mailto:rhuetter@mote.org>]  
**Sent:** March-05-18 1:20 PM  
**To:** MacDonald, Jennifer  
**Cc:** Bowlby, Heather; Chris Fischer; [REDACTED] Danielle Pernette; Bryan Franks; Fernanda Ubatuba  
**Subject:** Further information on OCEARCH methodology

My apologies if this is a repeat message, I'm experiencing some problems with my computer and I'm not sure my first attempt went through --

Hi Jenn:

In conversations we've had with one of our Canadian NGO partners (Coastal Action), it was brought to our attention that questions are still being raised about the need for OCEARCH's methodology for studying large sharks. More specifically, that everything we are doing can be done with non-capture methods such as being used by the Division of Marine Fisheries in Massachusetts. Nothing could be further from the truth, and to illustrate that, I put together the attached table comparing the two types of methodologies for your information.

In reviewing our SARA permit application please keep in mind that NOAA has closely scrutinized all of

OCEARCH's methods and has issued us federal permits for our work in U.S. waters.

I'm including copies of our application and our document providing further requested information, for the benefit of the others on this email.

We look forward to discussing our request with you soon, and we hope to work with any and all DFO scientists who wish to take advantage of the opportunities OCEARCH presents for studies of these large sharks in Canadian waters.

Best regards,

Bob

--

**ROBERT E. HUETER, Ph.D.**

*Senior Scientist & Director, Center for Shark Research*

*Perry W. Gilbert Chair in Shark Research*

*Manager, Sharks & Rays Conservation Research Program*

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*Chief Science Advisor*

*OCEARCH*

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Tel: 941-388-1827

Fax: 941-388-4312

More info at: [www.mote.org](http://www.mote.org)

## MacDonald, Jennifer

---

**From:** Sooley, Darrin  
**Sent:** March-16-18 10:44 AM  
**To:** MacDonald, Jennifer  
**Subject:** RE: White shark permit - review

Hi Jennifer:

I have reviewed the Draft Permit and Permit Assessment and Approval form and offer comment (in track changes as "Comment D#) on both documents as per the attached files.

As we discussed at the outset the intent is to issue separate (but very similar) S.73 SARA Permits one from Maritimes Region and one from NL Region, with these changes I think we are well on the way to doing so.

As promised I will try to draft the Permit Rationale and send to you later today. Unfortunately my duties as Acting Regional Manager SAR Program keep getting in the way ☺. It is my understanding that we will need to submit a bilingual permit rationale to Kristina Makkay for review and posting on the SARA Registry before we issue the permits.

If any questions with attached comments let me know.

Darrin

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**From:** MacDonald, Jennifer  
**Sent:** March-13-18 8:56 AM  
**To:** Sooley, Darrin  
**Subject:** RE: White shark permit - review

That would be great Darrin – thanks! If possible, I'd like to get them to Donald before our call with OCEARCH next week.

Cheers,  
Jenn

**Jennifer MacDonald**  
Species at Risk Management Division  
(902) 407-8175

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**From:** Sooley, Darrin  
**Sent:** March-13-18 8:16 AM  
**To:** MacDonald, Jennifer  
**Subject:** RE: White shark permit - review

Thanks Jenn:

I will try to finish the draft permit rationale and send to you before end of the week. I will review these two documents and let you know any thoughts and comments hopefully by the end of the week as well.

Cheers,

Darrin

---

**From:** MacDonald, Jennifer  
**Sent:** March-12-18 2:05 PM  
**To:** Sooley, Darrin  
**Subject:** White shark permit - review

Hi Darrin,

Attached is the latest draft of the Assessment and Approval form for the OCEARCH permit application review, as well as a draft of the permit itself. I would appreciate if you could provide any comments. [REDACTED] perhaps we could touch base on this next week? There are a few items that still have comments included – I had a few follow-up clarifications for Science that I've flagged in the documents, [REDACTED] so I didn't want to delay sending this to you any longer.

We are still trying to confirm a time for a call with OCEARCH (it keeps getting rescheduled), but it won't be until at least next week, [REDACTED] I've flagged a couple of questions in the attached to raise on the call with them as well.

Thanks!  
Jenn

**Jennifer MacDonald**

Species at Risk Biologist | Biologiste des espèces en péril  
Species at Risk Management Division | Division de la gestion des espèces en péril  
Ecosystem Management | Gestion des écosystèmes  
Fisheries & Oceans Canada | Pêches & Océans Canada  
P.O. Box 1006 Dartmouth N.S. | C.P. 1006 Dartmouth N.E. B2Y 4A2  
Tel | Tél: (902) 407-8175 Fax | Téléc: (902) 426-2331  
Email | Courriel: [jennifer.macdonald@dfo-mpo.gc.ca](mailto:jennifer.macdonald@dfo-mpo.gc.ca)



Fisheries and Oceans  
Canada

Pêches et Océans  
Canada

SARA Permit No: DFO-MAR-2017-17

## PERMIT ISSUED UNDER SECTION 73 OF THE SPECIES AT RISK ACT

Subject to the conditions described in this permit, the holder of this permit ("Permit Holder"), or any qualified person acting under the authority of the Permit Holder, is authorized under the authority of subsection 73(1) of the *Species at Risk Act*, S.C. 2002, c.29 (SARA) to engage in activities (as described in this permit) that **harm, harass, capture, and possess** individuals of the following threatened or endangered aquatic species listed on Schedule 1 of SARA:

Commented [D1]: See comment D2 below

**White Shark** (*Carcharodon carcharias*), Atlantic population

### Permit issued to:

Name: OCEARCH ("Permit Holder"):  
Attention to: George Christopher Fischer  
Address: 1790 Bonanza Drive, Suite 101B  
Park City, Utah, USA 84060  
Email: [chris@oceanarch.org](mailto:chris@oceanarch.org)  
Phone: (435) 645-8990 (office) [REDACTED] (cellular)

The following individual operating under the authority of Fisheries and Oceans Canada (DFO) as "Permit Holder", and those under his supervision, may undertake the activities authorized by this permit:

Commented [DF03]: This is not part of the template from NHQ

Commented [D2]: I wonder will we need this table? Is this not already covered off by the first line of the permit see hilted text above?

Name	Organization

### Location of Proposed Activity

This permit is only valid at the following location(s):

Nearest community (city, town, village): N/A

Municipality, district, township, county: N/A

Province: N/A

Name of watercourse(s), waterbody(ies): **Atlantic Ocean**

Specific location: **DFO Maritimes Region**

Commented [DF04]: Application indicated the following:  
•Mahone Bay (44° 29.50' N / 64° 13.50' W and adjacent areas  
•Bay of Fundy (44° 54.00' N / 66° 32.50' W and adjacent areas  
•Sable Island (43° 56.14' N / 59° 56.59' W)

Should the permit be more specific?

### Valid Permit Period

This permit is valid from [REDACTED] until **October 31, 2018**

If the Permit Holder cannot complete the activity during this period, Fisheries and Oceans Canada (DFO) must be notified in advance of the expiration of the time period, as soon as the Permit Holder is aware.

The period during which other conditions of this permit must be complied with are provided in their respective sections below. DFO may, where appropriate, amend this permit. In cases where the Valid Permit Period is extended, written notice and/or an amended permit will be provided to the Permit Holder.

Commented [AG5R4]: Could you be specific but also include the flexibility for them to go elsewhere IF they notify DFO (for safety, we should be notifying beach goers and fish harvesters that may be in the area during chumming).

Commented [D6]: I tend to agree with AG5R4 we could be specific but have a flexibility clause that if they for some reason need to go to a different area that they first come to DFO in Maritimes and NL (depending on where they are) to make us aware of the change. In terms of being more specific I think we could include the specific areas as they are described in the Application however to me the specific locations would be better placed within the "Description of Activities" section of the Permit.

Canada

.../2

- 2 -

SARA Permit No. : DFO-MAR-2017-17

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### Description of the Activity

The purpose of the activity is to conduct scientific research on White Sharks in Canadian waters to gain a better understanding of the role of Canadian waters in the life history of the White Shark population in the northwest Atlantic Ocean, the range of the species within Canadian waters and health of White Sharks. The researchers will attach acoustic and satellite tags, as well as collect various biological samples, from up to 20 sharks in Canadian waters.

Researchers will use chum to attract White Sharks in the study area to the fishing boat and larger research vessel. When a White Shark is sighted, either visually or using a drone, the fishing boat will target its fishing activities to attract and capture that shark. Chum bags, chum boxes, bait tanks, chum tubes and decoys may all be used to attract White Sharks to the fishing vessel. Once a White Shark is in the vicinity of the fishing vessel, the researchers will attempt to catch the shark using a 20/0 circle hook (zero offset) with a bite-blocker attached. In the case of a very large White Shark, a 27/0 circle hook (zero offset) with a buoy to prevent swallowing of the hook will be used. Once caught, the White Shark will be guided onboard the hydraulic lift on the research vessel, which is then raised above the waterline. While on the lift, sharks will be provided with oxygenated seawater via a mouthpiece and tube.

Once on the lift, internal acoustic tags will be implanted surgically in the coelomic cavity and the incision will be sutured. Smart Position and Temperature (SPOT) tags will be attached on the leading edge of the first dorsal fin by drilling four holes in the dorsal fin with an electric drill and attaching the tag with nylon bolts, stainless steel locknuts and plastic spacers. The hardware is designed to retain the tag for five years after which it will fail and the tag will detach. All White Sharks caught, up to 20, will have both acoustic and SPOT tags applied. Pop-up Archival Satellite Tags (PSAT) will be attached via a tether to a subdermal metal dart implanted in the shark's flank below the first dorsal fin. PSAT tags will be attached to up to 6 White Sharks caught.

The researchers will also collect samples (blood, muscle, semen, fecal and urine samples), conduct skin, gill and cloacal swabs, collect parasites, collect eye and tail measurements, and perform an ultrasound (females). Samples will be collected using a hypodermic puncture and biopsy punch.

The activities authorized by this permit consist of:

- Actively attracting White Sharks to a vessel;
- Catching White Sharks and lifting individuals out of the water on a hydraulic lift;
- Collecting blood and tissue samples;
- Implanting internal acoustic tags; and
- Attaching SPOT and PSAT tags.

The effects that the activity may cause to the listed wildlife species and the effects of those changes authorized by this permit are as follows:

- Harm, harassment, capture and possession of listed aquatic species at risk.

.../3

- 3 -

SARA Permit No. : DFO-MAR-2017-17

## Terms and Conditions of Permit

The activity must be carried on in accordance with the following conditions:

### 1. General Conditions

- 1.1. A copy of this permit shall be kept on site at all times in the possession of the Permit Holder or a person acting under the Permit Holder's authority, and shall be made available to an enforcement officer upon request.
- 1.2. All persons undertaking the activity under the authority of the Permit Holder shall do so under the direction and oversight of the Permit Holder and shall be made familiar with the conditions of this permit.
- 1.3. The activity must comply with the conditions identified within this permit. Activities that affect individuals of species at risk, their residences, or their critical habitat, other than those specifically identified within this permit are not authorized under this permit.
- 1.4. No changes to the Permitted activities shall take place without prior consultation with DFO, and written approval from DFO, Species at Risk Management Division. Contact information as follows:

**Species at Risk Management Division**  
**Fisheries and Oceans Canada**  
**P.O. Box 1006**  
**Dartmouth, NS, B2Y 4A2**  
**email: [SpeciesatRisk.xmar@dfo-mpo.gc.ca](mailto:SpeciesatRisk.xmar@dfo-mpo.gc.ca)**  
**phone: 1-866-891-0771 fax: 1-902-426-2331**

**Commented [D7]:** We will add our Regional Manager as the contact for the NL Region Permit

### 2. Conditions to avoid or minimize the impact of the activity on the species:

- 2.1. To the extent possible, activities shall be conducted in a manner whereby any individuals of the species shall be handled only in the circumstances authorized under this permit and with the least amount of harm.
- 2.2. Only individuals that are experienced in tagging large pelagic fishes shall tag White Sharks.
- 2.3. White Sharks shall not be chased by the vessel.
- 2.4. The following gear shall be used: circle hooks (either 20/0 or 27/0 with zero offset) rigged with a cross bar bit-blocker (30cm up the leader) and attached to a stainless steel wire rope (3/32" or 1/8"). The leader shall be 10m in length and shall be attached to a braid rope with elasticity properties. Leaders shall be embedded inside a three-strand rope to increase the diameter.
- 2.5. Individual White Sharks shall not be kept on the research platform for longer than 20 minutes.
- 2.6. While on the research platform, oxygenated seawater shall be pumped through a hose and mouthpiece into the shark's buccal cavity at all times.
- 2.7. While on the research platform, a tail rope shall be used to prevent the animal from causing harm to itself and others.
- 2.8. While on the research platform, the head and eyes shall be covered with wet terrycloth towel to reduce animal stress and keep eyes moist.
- 2.9. While on the research platform, the skin shall be kept wet.
- 2.10. While on the research platform animal stress shall be monitored by observing skin colouration, presence of blood pooling, gill movements, and animal activity. If acute stress is observed, the animal shall be released immediately.
- 2.11. The total time of engagement with a single White Shark from the time it is initially hooked until it is released shall be limited to ## minutes.
- 2.12. No more than 20 White Sharks, in total, shall be tagged.
- 2.13. No attempts shall be made to tag White Sharks that are injured or behaving abnormally.
- 2.14. Only White Sharks between 13 and 18 feet in total length shall be caught and tagged.
- 2.15. A DFO representative shall be onboard as an observer throughout the duration of the expedition.
- 2.16. In the event of a mortality or significant injury being sustained by a White Shark during a tagging attempt, all further attempts at tagging shall cease and DFO shall be contacted immediately (insert

**Commented [DFO8]:** Note 2.3 to 2.10 are all related to the mitigations identified by OCEARCH themselves. Items 2.11 to 2.16 are additional mitigations req'd by DFO.

**Commented [D9]:** How many minutes would this be? Does the OCEARCH permit application and their additional information provide a ultimate timeframe? Condition 2.5 above indicates maximum 20 minutes on the sampling platform and I think they indicate maximum time of 5-10 minutes to capture. So can we (do we want to) specify indicate 25-30 minutes ??

**Commented [DFO10]:** Need to check these sizes; have sent info to Science for input.

**Commented [D11]:** I should know this but it does not come to the top of my mind – does the OCEARCH permit and/or their additional information provide size ranges for white sharks to be captured? If so then I think we should reference that unless there is some reason for limiting the capture to animals of 13-18 feet.

.../4

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SARA Permit No. : DFO-MAR-2017-17

appropriate contact info). No further attempts at catching or tagging White Sharks shall be resumed until approved by DFO.

**Commented [DFO12]:** Have sent question for follow-up to Science

**3. Conditions that relate to monitoring and reporting:**

- 3.1. By January 31<sup>st</sup>, 2019, irrespective of whether the Permitted activities took place, a SARA Section 73 Permit Report shall be completed and returned to the Species at Risk Management Division using the contact information provided in condition 1.4. Without limiting the generality of the foregoing, the report shall contain the following information, to the satisfaction of DFO in its sole discretion:
- 3.1.1. to demonstrate that measures and standards to avoid and mitigate the impacts of the permitted activities on the species were implemented according to the conditions of this permit;
  - 3.1.2. an assessment of whether the measures and standards mentioned in condition 3.1.1 were successful at avoiding and mitigating the impacts of the permitted activities on the species;
  - 3.1.3. details of any contingency measures that were followed to prevent impacts greater than those authorized by this permit;
  - 3.1.4. for any interaction with, or sighting of, a White Shark, report the following: date, time, location, length, size, gender (specify if females are pregnant or not), condition of the individual; and identify if tagging was attempted or undertaken on that individual; and
  - 3.1.5. provide details of any tagging attempts, including whether tagging was successful, unplanned or unexpected impacts on the shark, reaction of the shark to the tagging, and lessons learned.

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**Authorization Limitations and Application Conditions**

This permit cannot be transferred or assigned to another party. If the activity authorized under this permit is sold or transferred to another party, or if other circumstances arise that result in another party taking over the activity, the Permit Holder shall advise DFO in advance if the ownership or responsibility for the activity is expected to change.

The failure to comply with any condition of this permit is an offence under section 97 of SARA and might result in charges being laid under SARA.

This permit may be revoked or amended to ensure the survival or recovery of White Shark. Without limiting the generality of the foregoing, DFO may:

- suspend any permitted activities to avoid or mitigate additional adverse direct or indirect effects to White Sharks;
- amend or revoke this permit; and
- direct the Permit Holder to carry out at the Permit Holder's expense any modifications or actions deemed necessary by DFO to avoid or mitigate existing impacts or to avoid further adverse direct and indirect impacts to White Sharks.

This permit is valid only with activities and species listed herein and for no other purposes. It does not authorize the Permit Holder to [kill, capture, take, possess, collect, buy, sell, trade, damage the residence of, destroy the residence of, destroy part of the critical habitat of] *[Retain only those that apply]* an individual of a wildlife species that is listed as extirpated, endangered or threatened, or any part or derivative of such an individual. This permit does not purport to release the Permit Holder from any obligation to obtain permission from or to comply with the requirements of any other regulatory agencies.

**Commented [DFO13]:** This sentence is from the national template but not included in other MAR permits

**Commented [D14]:** We include a version of this sentence in our S.73 Permits as follows "*It does not authorize the Permit Holder to kill, buy, sell or trade an individual of a wildlife species that is listed as extirpated, endangered, or threatened or any part or derivative of such an individual*" We are permitting the permit holder to "capture, possess" white shark so not sure we can include capture, take, possess" in this sentence. I think it is fairly safe to say that the planned activity will not damage a residence or destroy critical habitat of White Shark so we may not need to include same in this sentence. Just my thoughts.

Date of Issue: Month/Day/Year

Signature of authorizing officer:

Donald Humphrey

**Commented [D15]:** For our permit we will identify Regional Manager for SARA Program NL Region with our contact information NL Regional SARA

.../5



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SARA Permit No. : DFO-MAR-2017-17

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Manager, Species at Risk Management Division  
Maritimes Region  
Fisheries and Oceans Canada  
1 Challenger Drive, P.O. Box 1006, Dartmouth, NS, B2Y 4A2

Further information about this permit is available from the above authorizing officer ([Donald.Humphrey@dfo-mpo.gc.ca](mailto:Donald.Humphrey@dfo-mpo.gc.ca)).

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Fisheries and Oceans  
Canada

Pêches et Océans  
Canada

FILE NO: DFO-MAR-2017-17  
17-PNFL-00020

**Ecosystem Management – Assessment and Approval of  
Species at Risk Act (SARA) Section 73 Permit Application**

**1. APPLICANT INFORMATION**

Permit Renewal? ☐ Yes ☒ No  
Permit Amendment? ☐ Yes ☒ No  
Is this a multi-year permit application? ☐ Yes ☒ No  
If so, what is the starting year and ending year:  
Previous Permit Number(s): n/a

**Individual(s) or Organization to appear as the Licensee on the Permit**

Name: OCEARCH  
Contact: George Christopher Fischer  
Email: chris@oearch.org  
Address: 1790 Bonanza Drive, Suite 101B  
Park City, Utah, USA 84060  
Phone: 435-645-8990

The following individuals and those under their direct supervision may undertake the activities authorized by the permit:

Name	Organization

**2. ACTIVITIES INFORMATION**

a) **Listed Species Affected:** White Shark (*Carcharodon carcharias*), Atlantic population - Endangered

**b) Project Summary:**

OCEARCH is proposing to conduct scientific research on White Sharks in Canadian waters to provide information in relation to a number of questions, including understanding the role of coastal waters off Nova Scotia and Newfoundland in the life history of the White Shark population, the range of the White Shark population in the northwest Atlantic, the health of White Sharks inhabiting Canadian waters, and adaptations of White Sharks for northwest Atlantic waters.

OCEARCH is proposing to conduct a research expedition in Canadian waters in September/October 2018, involving a collaborative team of scientists who will be onboard and collecting data to support a number of research projects. Sharks will be caught and guided to a research platform on the M/V OCEARCH. Research procedures (sampling and tagging) will be carried out on board the vessel, following which the animals will be released live. OCEARCH has requested a permit to tag 20 sharks in Canadian waters based on their analysis that 60 sharks are required for their various research studies (20 young-of-the-year, 20 immature and 20 mature); to date OCEARCH has tagged 33 sharks in the north Atlantic.

Canada

**Actively attracting White Sharks to the fishing boat and the larger research vessel** will be carried out by placing chum in the water using a variety of techniques. Observers on board the vessel scan for signs of White Shark activity and OCEARCH also makes use of drones, to search for White Sharks. To attract sharks, a combination of chum bags, chum boxes, bait tanks, chum tubes and decoys are used. The chum consists of whale blubber and oil, mackerel and tuna, and/or menhaden oil. OCEARCH will seek a marine mammal permit from DFO to authorize the use of marine mammal material in Canadian waters.

**White Sharks will be caught** from the fishing boat using a circle hook (20/0 or 27/0 with zero offset). The hooks will be rigged with a crossbar bite-blocker (30cm up the leader) to prevent the shark from swallowing the bait. The hook will be attached to stainless steel wire rope (3/32" or 1/8"); the leader is about 10m and will be attached to a braid rope with elasticity properties to reduce hard shock when the initial struggle ensues. Typically within 5-10 minutes of being caught, the White Shark is guided onto the hydraulic lift on the research vessel.

**White Sharks will be lifted out of the water** on a hydraulic lift that is lowered off the research vessel. The lift, which includes side guides and an end gate to prevent the shark from swimming off, will be lowered below the waterline and the shark guided on. The lift will then be slowly raised above the water. Once on the lift, the hook will be removed from the shark's jaw. Oxygenated seawater will be pumped through a hose and mouthpiece (allowing for simultaneous flushing of the gills on both sides of the head) into the shark's buccal cavity at all times while on the lift. The shark will be on its side for the initial 5-7 minutes (to take blood samples, implant the acoustic tag, perform ultrasound) then it is rolled to an upright position (to attach satellite tag). Other procedures undertaken while the White Shark is on the lift will be the collection of swabs (skin mucus, gill surface and cloacal swabs); collection of parasites, collection of semen, fecal, and muscle samples, as well as possibly urine samples if the animal urinates while on deck, and the collection of eye and tail measurements.

**Blood and tissue sampling** will be conducted while White Shark are onboard the vessel. A hypodermic puncture and biopsy punch will be used to obtain blood (<25ml), muscle (<5g), semen, and skin mucus samples.

**Implantation of internal acoustic tags** will be conducted by making a surgical incision to insert a sterilized transmitter (1cm x 6cm) into the coelomic cavity. The incision will be sutured and the sutures will be absorbed over a period of time. OCEARCH is proposing to insert the internal acoustic tags in every White Shark (up to 20) caught in Canadian waters under this permit application.

**Attachment of satellite tags** will be conducted by drilling and bolting Smart Position or Temperature (SPOT) tags on the leading edge of the first dorsal fin. The SPOT tags (Wildlife Computers Model SPOT-257) measure 162 x 57 x 20 mm and weigh 160 g. To attach the tag, four holes are drilled in the dorsal fin with an electric drill (drill bit will be cleaned and sterilized in alcohol before use). The tag will be attached with alcohol-sterilized nylon bolts, stainless locknuts and plastic spacers (standard hardware from the tag manufacturer). Tags will be coated with an antifouling compound. The hardware is designed to retain the tag for five years, after which it will fail and the tag will detach. OCEARCH is proposing to attach a SPOT tag to every White Shark (up to 20) caught in Canadian waters under this permit application.

Pop-up Satellite Archival Tags (PSAT) will be attached via a tether to a subdermal metal dart implanted in the shark's flank below the first dorsal fin. PSAT tags are provided to OCEARCH by a collaborator at the Woods Hole Oceanographic Institution. The number of tags has not been confirmed, but will likely be 4-6 tags. The PSAT tags will be attached, in addition to acoustic and SPOT tags, on 4-6 White Sharks.

OCEARCH is also potentially looking to use a prototype tag that is a combination of a PSAT and SPOT tag. The tag is attached via a darted tether in the same way as a PSAT tag. If these new prototype tags are available, they will be used instead of the PSAT tag on 4-6 White Sharks. As these are prototype tags, OCEARCH is proposing to use these tags in combination with the SPOT tags to validate the new tag's geolocation data.

**Commented [D1]:** Therefore can we say max time of encounter with a white shark would be 25-30 minutes – 5-10 (capture + 20 minutes (in sampling cradle on the vessel))?? And reflect same in the permit

**c) Analysis of Proposed Activities:**

<b>Location:</b> Atlantic Ocean				
Coastal Nova Scotia:				
<ul style="list-style-type: none"> <li>• Mahone Bay (44° 29.50' N / 64° 13.50' W and adjacent areas</li> <li>• Bay of Fundy (44° 54.00' N / 66° 32.50' W and adjacent areas</li> </ul>				
South Coast of Newfoundland:				
<ul style="list-style-type: none"> <li>• Placentia Bay (47° 05.00' N / 54° 32.00' W</li> </ul>				
Sable Island (43° 56.14' N / 59° 56.59' W)				
<b>Dates:</b> September 18-October 11, 2018				
Proposed Activity	Planned Effects/Outcome		Potential Incidental Effects/Outcome	
	Prohibitions that Apply	Likelihood of the prohibited impact(s)	Prohibitions that Apply	Likelihood of the prohibited impact(s)
Actively attracting White Sharks to a vessel (i.e., chumming)	Harass	Med	Harm Kill	Low Low
Capture of White Sharks	Harass Harm Capture	High Low High	Kill	Low
Lifting White Sharks out of the water	Harass Harm Capture	High Low High	Kill	Low
Blood and tissue sampling	Harass Harm Possess	Med Low High	Harm	Low
Implantation of internal acoustic tags	Harass Harm	Med Low	Kill	Low
Attachment of satellite tags -- SPOT tags	Harass Harm	Med Low	Kill	Low
Attachment of satellite tags -- PSAT tags	Harass Harm	Med Low	Kill	Low

Impacts to individual White Sharks would result from any distress associated with the approaching vessel, being caught and brought onboard the vessel and out of the water, the application of the different tag types and the collection of biological samples.

**Actively attracting White Sharks to a vessel (i.e., chumming)**

A number of studies suggest that the presence of chum may be linked to modification of White Sharks' normal swimming and/or hunting behaviours, although the effects are likely short term when chum is used for short term research projects.<sup>1</sup> It is possible that attracting a White Shark will cause the individual to stray from patrolling for food or from mating. Disturbance to normal feeding behaviours may result in energetic costs.<sup>2</sup>

There is a possibility that attracting sharks to the fishing boat or the research vessel may result in collisions between the shark and the vessel and that the presence of the vessel may cause behavioural changes.

<sup>1</sup> NOAA. 2014. Draft Programmatic Environmental Assessment of Potential White Shark Research and Education Projects within the Gulf of the Farallones and Monterey Bay National Marine Sanctuaries. [https://nmssanctuaries.blob.core.windows.net/sanctuaries-prod/media/archive/library/pdfs/gfrms\\_draft\\_white\\_shark.pdf](https://nmssanctuaries.blob.core.windows.net/sanctuaries-prod/media/archive/library/pdfs/gfrms_draft_white_shark.pdf)

<sup>2</sup> Semmens, J.M., Payne, N.L., Huveneers, C., Sims, D.W. & Bruce, B.D. 2013. Feeding requirements of White Sharks may be higher than originally thought. Sci. Rep. 3, 1471; DOI:10.1038/srep01471 (2013).

#### **Catch of White Sharks**

Catch and release fishing is a source of stress to White Sharks due to the potential for long fight times (exhausting the individuals) and injury from wounds caused by the hooks. Long capture times have been known to kill bony fish and other sharks.<sup>3</sup> Physiological disruptions to fish result from the high anaerobic activity, muscle fatigue and time spent out of water caused by capture using most fishing techniques.<sup>4</sup>

Injury can result from the wound caused by the hook, although the extent of the tissue damage or injury will depend on the location of the hook and the type of gear. Sub-lethal injury can result from removing hooks or leaving them in place in the throat, esophagus or gut. In the short term, a hook in the mouth will cause a loss of blood, but the wound would be expected to heal within a year or less. Circle hooks are known to cause lower incidences of internal injury than conventional J hooks.<sup>5</sup>

Although not specific to White Shark, a study in Australia examined post release survival in Shortfin Mako by attracting individuals to a boat using chum, then using monofilament line and either J hooks or circle hooks to catch the sharks. The study showed that the length of the fight time did not impact survival. Circle hooks significantly reduced foul hooking. The study showed that hook choice affected the likelihood of mortality, while the species' is able to cope with long fight times and associated physiological responses to capture due to its endothermy and high aerobic scope.<sup>6</sup>

It has been suggested that sharks, in general, are capable of recovery from physiological stress associated with capture and that any mortality is more likely linked to the extent of any physical injuries.<sup>7</sup>

#### **Lifting White Sharks out of the water**

The research platform is raised and the White Sharks are lifted from their natural, in-water environment. This removal from the water likely results in physiological stress and possible oxygen deprivation.

Lifting White Sharks out of the water, onto a hard raised platform, may create excessive pressure on tissues and organs that usually do not bear weight. This impact may be greater in larger individuals.

While there are concerns about damage to internal organs, there is no evidence reported of internal organs being crushed when sharks are removed from the water.<sup>8</sup> However, if sharks are thrashing on the deck, this could lead to internal injuries.

OCEARCH has taken blood samples in the first minute and the last minute on the lift for 120 White Sharks handled in this manner and found stress levels remain relatively low throughout the handling time. Higher amounts of stress due to capture were shown in very young White Sharks (however OCEARCH is not proposing to catch young sharks in Canadian waters).

#### **Blood and tissue sampling**

The *Canadian Council on Animal Care Guidelines on Care and Use of Fish in Research* suggest that blood samples be up to 1ml/kg body size. The volume proposed to be collected by this project is well under this recommended amount.

The retention of the blood and tissue samples involves possession of parts of individuals.

#### **Implantation of internal acoustic tags**

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<sup>3</sup> NOAA 2014

<sup>4</sup> Skomal, G.B. 2007. Evaluating the physiological and physical consequences of capture on post-release survivorship in large pelagic fishes. *Fisheries Management and Ecology*. 14: 81-89.

<sup>5</sup> NOAA 2014

<sup>6</sup> French R.P., Lyle J., Tracey S., Currie S., Semmens J.M. 2015. High survivorship after catch-and-release fishing suggests physiological resilience in the endothermic shortfin mako shark (*Isurus oxyrinchus*). *Conserv Physiol* 3: doi:10.1093/conphys/cov044.

<sup>7</sup> Skomal 2007

<sup>8</sup> NOAA 2014

Implanting internal acoustic tags requires making a surgical incision, from which there could be a risk of infection or causing harm to the individual.

#### **Attachment of satellite tags (SPOT and PSAT)**

In terms of physical injury associated with the tagging, shark species in general are very resilient to superficial cuts and have a tremendous capacity to heal from injury.<sup>9</sup> Similar and much more extensive lacerations occur frequently during mating behaviours, and one of the identifying characteristics of a mature female shark is deep scarring along her dorsal musculature. The tagging site is expected to close over very quickly with minimal effect on the animal, as has been observed in other species held in captivity after tagging.

Various studies have examined possible longer term effects of electronic tags or data loggers on the swimming efficiency of sharks, but results have been variable.<sup>10</sup> There may be a marginally increased drag while swimming due to the external tag.

A study from South Africa suggests that SPOT tags can cause permanent cosmetic and structural damage to the dorsal fins of White Sharks, depending on how long the tag is attached for. Tags that detach within 12-24 months did not seem to cause long term damage; while after 24 months permanent damage to the dorsal fin was reported. However, the study did not show that the damage to the dorsal fin resulted in impacts to long term survival or body growth.<sup>11</sup>

Research from Monterey Bay Aquarium also showed that real-time satellite tags attached with multiple bolts on juvenile White Sharks affects the growth of the dorsal fin (growing around the tag or causing a deflection to the tip of the fin). They suggested that there may be more of a reaction to the presence of the bolts and tag in growing tissue.<sup>12</sup>

OCEARCH has provided photographs of White Sharks observed years after tagging that show that the fins have healed and are functioning properly.

#### **Post Release Behaviour and Longer Term Effects**

Results from research in which White Sharks were caught and restrained using an in-water stretcher and then tagged, has shown a six to 48-hour recovery period for individuals after capture and tagging.<sup>13</sup>

Post-release behavioural studies by OCEARCH collaborating scientists using accelerometers attached to the sharks have shown recovery and resumption of natural swimming behaviour within approximately 6 hours after release.

Research conducted off the west coast of California that involved tagging 21 White Sharks (2007-2012), found that they resumed 'normal' behaviours after tagging, as determined by their migration patterns. These sharks were tagged with SPOT tags (using various methodology including being lifted onto a platform out of the water and being tagged while alongside the research boat).<sup>14</sup>

It has been suggested that catch and release of marine pelagic fish may have sublethal population level effects due to reduced individual fitness. However, as these population level effects are difficult to assess in highly migratory species with poorly understood life histories, this has not been quantified or studied in depth.<sup>15</sup>

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<sup>9</sup> NOAA 2014

<sup>10</sup> Hammerschlag, N., 2011. A review of shark satellite tagging studies. J. Exp. Mar. Biol. Ecol. doi:10.1016/j.jembe.2010.12.012

<sup>11</sup> Jewell O.J.D., Wcisel M.A., Gennari E., Towner A.V., Bester M.N. 2011. Effects of Smart Position Only (SPOT) Tag Deployment on White Sharks *Carcharodon carcharias* in South Africa. PLoS ONE 6(11): e27242. doi:10.1371/journal.pone.0027242

<sup>12</sup> NOAA 2014

<sup>13</sup> NOAA 2014

<sup>14</sup> NOAA 2014

<sup>15</sup> Skomal 2007

As little is known about White Shark mating behaviour, it is unknown whether tagging could have an impact on mating.<sup>16</sup>

There is anecdotal evidence of at least one White Shark having died following interactions with OCEARCH using the methods proposed here.

#### Summary

Based on the above assessment, the following activities have the potential to contravene the SARA prohibitions and therefore must be authorized under SARA:

- Actively attracting White Sharks to a vessel;
- Catching White Sharks and lifting individuals out of the water on a hydraulic lift;
- Collecting biological samples from White Sharks;
- Implanting internal acoustic tags; and
- Attaching SPOT and PSAT tags to White Sharks.

The effects that these activities may cause to White Sharks include:

- Capture and harassment of, and potentially harm to, individuals,
- Possession of samples from individuals, and
- Although unlikely, killing of, individuals.

The Species at Risk Management Division has concluded that the activities associated with the above project are likely to affect the **White Shark, Atlantic population**, in a manner that is prohibited by SARA, and therefore a SARA Section 73 permit is considered necessary to engage in the proposed activities.

### 3. REGULATORY ASSESSMENT OF APPLICATION

#### Necessity Assessment

Work through the following five questions to determine the appropriate action for DFO to take in response to the permit application.

1. Is it likely that one or more species listed on Schedule 1 of the SARA occurs at any of the locations identified for the proposed activities?

☒ Yes ..... Go to next question  
☐ No .....

**A SARA permit is not necessary. The applicant will be informed in writing and advised to ensure any other required authorizations are obtained before proceeding with the activities. Go to Assessment Summary.**

2. Are any of the SARA-listed species concerned considered an "Aquatic Species" as per the definition in the *Fisheries Act*?

☒ Yes ..... Go to next question  
☐ No .....

**The applicant will be directed to resubmit the application to the appropriate agency. Go to Assessment Summary.**

3. Are the locations at which any of the activities are proposed to take place under the jurisdiction of Fisheries and Oceans Canada?

☒ Yes ..... Go to next question  
☐ No .....

<sup>16</sup> NOAA 2014

The applicant will be directed to resubmit application to the appropriate agency. Go to Assessment Summary.

4. Is it certain or likely that performing any of the proposed activities will affect the SARA-listed species concerned in a way to contravene the general prohibitions of SARA (subsections 32(1), 32(2), section 33, subsections 36(1), 58(1), 60(1) and 61(1))?

☒ Yes ..... Go to next question  
☐ No .....

A SARA permit is not necessary. The applicant will be advised of this in writing. Go to Assessment Summary.

5. Do any of the exceptions listed in SARA Section 83 apply to the proposed activities concerned?

☐ Yes .....

A SARA permit is not necessary. The applicant will be advised of this in writing and the basis on which an exception applies will be described here. Go to Assessment Summary.

☒ No .....

A SARA Section 73 permit is required to avoid contravention of the prohibitions of SARA. DFO will proceed with the application to assess eligibility. Go to Eligibility Assessment.

**Commented [JM2]:** s. 83(5d): Subsection 32(2) does not apply to a person who possesses an individual of a listed species or any part of an individual if the person acquired it by succession from someone who was entitled to possess it under this Act.

-other review forms have listed all those that will receive/possess samples

#### Eligibility Assessment

The following two questions assess whether the proposed activities are eligible for a SARA Section 73 permit.

1. Section 73(2): The purpose of the proposed activities is described by **one or more** of the following:

- ☒ The activity is scientific research relating to the conservation of SARA-listed species and will be conducted by qualified persons
- ☐ The activity benefits the species or is required to enhance its chance of survival in the wild.
- ☐ Affecting the SARA-listed species is incidental to carrying out the activity

The proposed activities aim to answer a number of research questions, both through the tracking of individual White Sharks that will be tagged and through analysis on blood and other tissue samples.

The draft Recovery Strategy for White Shark identifies the following as high priority research and management approaches:

- undertake scientific research to better understand population dynamics, distribution and habitat use.
- collect and maintain White Shark sightings information; maintain this information in a database and share via network

Qualified persons – need confirmation of the expedition leader

☒ Yes ..... Go to next question

☐ No .....

The proposed activities are not eligible for a SARA Section 73 Permit. Go to Assessment Summary.

**Commented [D3]:** How or when can we get this information?

2. Section 73(3): The proposed activities meet **all** of the following pre-conditions:

- ☐ All reasonable alternatives to the activity that would reduce the impact on the species have been considered and the best solution has been adopted



In the consideration of alternatives to the proposed research, there are a number of alternatives that should be considered. The first alternative to consider would be to not undertake the activity and not conduct the research; however, given the many unknowns about the species this would not represent the best solution as it would be a loss of an opportunity to learn more.

There are no alternative locations to conduct the research, as it must be conducted within the range of the species.

In relation to the proposed activities, overall the applicant asserts that the methods and procedures proposed are the safest and most successful way of obtaining the necessary samples and attaching SPOT tags.

#### Attracting and Catching White Shark

- The alternative to chumming for White Shark is to not use chum, which would limit the ability to sight White Sharks to passive observations. Given the low numbers in a large area, chance encounters would be low, which would reduce or even eliminate the success rate of researchers attempting to deploy tags or obtain samples.

#### Catching, restraining and lifting the shark out of the water

- Alternative approaches include (1) attracting a shark and sampling/tagging it without restraining or catching it and (2) attracting a shark and catching it, but conducting sampling/attaching tags while the shark remains in the water.
- The following summarizes the type of tagging and sampling that is possible under each alternative:

	(1) No Capture	(2) Capture and Tag in Water	(3) Capture and Use of Lift
Tag Types	PSAT Acoustic (external)	SPOT PSAT Acoustic (external)	SPOT PSAT Acoustic (internal or external)
Other Samples	— muscle samples	— blood samples — swabs (skin mucus) — muscle samples	— blood samples — swabs (skin mucus, gill surface and cloacal swabs) — muscle samples — parasite samples — semen samples — fecal samples — urine samples (opportunistic) — eye/tail measurements — ultrasound

- Under alternative (1), the success rate for tagging and collecting samples would likely be less than using one of the alternative methodologies, which involve catching the sharks. This approach can also require chasing the individuals with a small to mid-sized boat, which can increase stress levels. There is a risk with this approach that tags would not be attached properly.
- Under alternative (2), some researchers have suggested that keeping the shark in the water reduces the stress experienced by the shark as a result of being lifted from the water. However, OCEARCH has indicated that sharks are more likely to struggle if they remain in the water, while being on the lift quiets the animals and therefore they conclude that the proposed method reduces the potential for harm to the sharks. Sampling and tagging using an alongside-boat method requires calm sea conditions, which are often not encountered. Working alongside a boat with a large animal that is likely to be struggling also increases the risk to researchers.
- With respect to the precise methodology proposed to capture sharks, the approaches proposed likely present the best alternative to reduce potential impacts. Alternatives would be to use a 'J' hook instead of a circle hook, to not use the bite blocker, to not embed the leaders in rope. However, all of

these alternatives would increase the risk of internal (e.g., gut-hooking) or external (e.g., lacerations) injury to the sharks.

#### Blood and tissue sampling

- An alternative method to collecting biological samples, would be collect samples by harpoon, while the shark remains in the water. However, the collection of blood samples, swabs of the skin mucus, gill surface and cloacal, parasite collection and semen samples require catching and controlling the animal. Further, attempting to obtain samples in the water increases the risk of sample contamination, loss of sample and infections in the shark. Muscle samples are taken from the site of the PSAT tag attachment reducing sample wounds on the shark.

#### Tagging

- SPOT, PSAT and acoustic tags all collect different types of data:
  - SPOT tags transmit location and other data in real time. Information is transmitted while the tag is attached to the shark; the data signal from these tags is sent when the shark's dorsal fin is at the surface. SPOT tags may transmit data for up to 3-5 years. To obtain real-time geolocation data from an animal that is wide ranging within areas that are previously unknown, SPOT tags provide the best option for collecting this data.
  - Data from PSAT tags is stored on the device and retrieved after the tag detaches from the shark. PSAT tags will collect data for approximately one year. PSAT tags provide archived temperature and depth data, but the geolocation data is less precise and not available in real-time.
  - Acoustic tags are useful to detect the arrival of an animal in an area where underwater acoustic receivers have been deployed (typically well-studied inshore areas). These tags provide fine-scale geolocation data, but only in areas where there are acoustic receivers.
- OCEARCH has indicated that to understand an animal's large scale movements and migration, SPOT tags are the most effective in revealing the precise tracks and this data, in their perspective, cannot be substituted with data from PSAT or acoustic tags. Further, the real time data from SPOT tags support their educational and outreach objectives.
- There are alternative attachment methodologies for tags:
  - Acoustic tags can be attached externally rather than internally. OCEARCH indicated concerns with the risk that external tags can be shed. However, other researchers have successfully utilized externally attached acoustic tags. OCEARCH information indicates that internally attached tags can provide data for up to 10 years, while externally attached tags may only transmit data for up to one year.
  - SPOT tags can also be attached as floating tags, however OCEARCH indicated concern that floating SPOT tags can be fouled, shed and lost from the animal very rapidly.
  - Other researchers have developed a technique to attach SPOT tags with a single bolt, rather than the four bolt attachment methodology proposed by OCEARCH.

- ☐ All feasible measures will be taken to minimize the impact of the activity on the species or its critical habitat or the residence of its individuals

The following measures were proposed by OCEARCH to minimize the impacts of the activities:

- individuals will not be chased by the vessel, but will be attracted using chum;
- gear will be used that will minimize the chance that animals are gut-hooked (including using circle hooks and a crossbar bite-blocker);
- animal struggles and injury will be minimized by:
  - using a leader attached to a braid rope with elasticity properties to help reduce hard shock during the initial struggle;
  - using a 10m leader length in case the shark rolls in the line to ensure that the shark cannot bite through the rope and escape (retaining the hook and leader);
  - embedding the leader inside a three-strand rope to give it a thicker diameter so that if the shark rolls, the thicker rope does not cut into the sharks' skin and is easier to unwrap;

- o using heavier tackle that keeps enough pressure on the shark so that the line is stretched tight and the shark cannot turn and roll.
- all research procedures will be conducted within 20 minutes;
- while on the research platform:
  - o oxygenated seawater will be pumped through a hose and mouthpiece (allowing for simultaneous flushing of the gills on both sides of the head) into the shark's buccal cavity at all times;
  - o a tail rope will be used to prevent the animal from causing harm to itself and others;
  - o the head and eyes will be covered with wet terrycloth towel to reduce stress and keep eyes moist;
  - o skin will be kept wet during in-air procedures to prevent drying;
  - o animal stress will be monitored by observing skin colouration, presence of blood pooling, gill movements, and animal activity:
    - if stress is detected in the animal, a blood sample will be taken to evaluate the shark's conditions;
    - if acute stress is observed, the animal will be released immediately.
- OCEARCH is currently seeking approval of their animal care plan from Jacksonville University and will notify DFO once that the approved plan is in place.

In addition, the permit will require that:

- the total time of engagement with a single White Shark be limited to (from the time it is initially hooked until it is released);
- a maximum number of 20 White Sharks can be tagged;
- only White Sharks between 13 and 18 feet in total length can be caught and tagged;
- a DFO Scientist or Observer must be onboard throughout the duration of the expedition;
- work will cease and DFO will be contacted immediately if there is any mortality of a White Shark or if a White Shark receives any significant injury and no further attempts at catching or tagging White Sharks will be resumed until approved by DFO;
- all interactions with White Sharks (including location of capture/tagging events; number and gender/age of all White Sharks caught and tagged) and all mitigation measures employed will be reported to DFO. In addition, unsuccessful tagging attempts, in which White Sharks were observed but not caught or tagged, will also be reported to DFO (location, length estimate, gender (if visible), weight).

**Commented [D6]:** See comment above on page 2 it would appear time limit may be 25 – 30 minutes = 5-10 for capture + 20 minutes in the sampling cradle on vessel

**Commented [DFO7]:** Need to check these sizes; sent question to Science

**Commented [D8]:** See too my comment on this length specification that I made on condition 2.14 ( page 3) of the draft S.73 SARA Permit.

☒ The activity will not jeopardize the survival or recovery of the species

Tagging of White Sharks is unlikely to jeopardize the survival or recovery of the population. The recovery goal in the draft recovery strategy is to: "Maintain or increase the population of White Sharks that frequent Atlantic Canadian waters." No mortality is expected as a result of the activities, and therefore recovery will not be compromised. Even in the very unlikely event that mortality occurs during the activities, Science advice indicates that the population of White Sharks in the NW Atlantic is increasing and current mortality levels (due to incidental capture in fisheries) would have to increase substantially before population trajectories would be predicted to decline. Therefore there is a high likelihood that recovery goals can be achieved under various scenarios of allowable harm for White Shark, even if annual bycatch mortality increases from historical estimates.<sup>17</sup>

☐ Yes ..... Go to Consultation Assessment  
☐ No ..... Go to Consultation Assessment

The proposed activities are not eligible for a SARA Section 73 Permit. Go to Assessment Summary.

<sup>17</sup> DFO. 2017. Evaluation of Scope for Harm for White Shark (*Carcharodon carcharias*) in Atlantic Canada. DFO Can. Sci. Adv. Sec. Sci. Resp. 2017/025.

### Consultation Assessment

The following two questions assess whether consultation with an outside party is required before issuing a SARA Section 73 Permit for the proposed activities:

- Section 73(4):** Do the proposed activities concern a species in an area in respect of which a wildlife management board is authorized by a land claims agreement to perform functions in respect of wildlife species?  
☐ Yes ..... **Go to Assessment Summary**  
☒ No ..... **Go to next question**
- Section 74(5):** Do the proposed activities concern a species in a reserve or any other lands that are set apart for the use and benefit of a band under the Indian Act?  
☐ Yes ..... **Go to Assessment Summary**  
☒ No ..... **Go to Assessment Summary**

### Assessment Summary

The above assessment is summarized below. In order to recommend that a SARA Section 73 Permit be issued for the proposed activities, the above assessment must demonstrate that doing so is warranted, lawful, and if applicable, that all consultation requirements of SARA s. 73(4) or 73(5) have been fulfilled. [highlight in red text the selected responses]

- The proposed activities warrant the need for a SARA Section 73 Permit.  
☒ Yes ..... **Go to next question**  
☐ No .....  
**A SARA permit is not necessary. The applicant will be advised of this in writing. Go to EM Permit Decision.**
- The proposed activities are consistent with all of the eligibility requirements of SARA Section 73.  
☐ Yes ..... **Go to next question**  
☐ No .....  
**The proposed activities are not eligible for a SARA s.73 Permit. Go to EM Permit Decision.**
- The permit decision, proposed activities, and any permit contents require consultation with an outside party.  
☐ Yes .....  
**Undergo consultation with the appropriate party before proceeding further in the permitting process.**  
☒ No .....  
**Issue a SARA s.73 Permit. Go to Ecosystem Management Permit Decision.**

### 4. REVIEW

Input sought from:

Name	DFO Sector
Aimee Gromack	DFO Maritimes - SARMD

5. ECOSYSTEM MANAGEMENT PERMIT DECISION

☐ A SARA Section 73 Permit is not considered necessary to engage in the proposed activities.

☒ Issue SARA Section 73 Permit subject to the conditions outlined in the SARA Section 73 Permit for DFO-MAR-2017-17.

☐ Do not issue Section 73 Permit.

6. SIGN-OFF

Reviewed by:

\_\_\_\_\_  
Donald Humphrey  
Regional Manager  
Species at Risk Management Division (Maritimes  
Region)

\_\_\_\_\_  
Date

\_\_\_\_\_  
Darrin Sooley  
Acting Regional Manager  
Species at Risk Management Division (Newfoundland  
and Labrador Region)

\_\_\_\_\_  
Date

**Commented [D9]:** Note if signed before March 31 could be me if after it will not be me my assignment in SARA ends on march 31, after March 31 will be Helen Griffiths.

**MacDonald, Jennifer**

---

**From:** Bowlby, Heather  
**Sent:** March-19-18 11:43 AM  
**To:** MacDonald, Jennifer; Joyce, Warren  
**Subject:** RE: White Shark permit questions  
**Attachments:** Dance et al16 does transmitter placement or species affect detection efficiency of tagged animals.pdf; McAuley et al17 broad scale coastal movements of white shark off WA using acoustic telemetry.pdf

Hi Jenn,

There is quite a bit of research out there comparing internal/external tags, but it is predominantly with finfish where you might expect a higher mortality rate from the anesthesia and surgical implantation. Anyways, I have attached one recent paper comparing the two tag attachment methods in Red Drum as well as a paper describing white shark movements using externally attached acoustic tags from West Australia.

For size, the argument could be made relative to the fin-mounted SPOT tags in particular. Warren sent that paper on how the tags affected fin growth in juvenile animals. This would potentially give you a minimum size for tagging. I have nothing that could inform setting a maximum size.

For mortalities, if the carcass could be easily obtained (i.e. the shark was dead on the line, not floating in the water column) then it would be useful to have scale samples for aging as well as a bunch of detailed morphology samples.

Best,  
 Heather

---

**From:** MacDonald, Jennifer  
**Sent:** March-12-18 1:07 PM  
**To:** Bowlby, Heather; Joyce, Warren  
**Subject:** RE: White Shark permit questions

Sorry – I hit send too soon! Do you know if there are studies on the risks/impacts associated with internal vs. external acoustic tags?

Thanks!

**Jennifer MacDonald**  
 Species at Risk Management Division  
 (902) 407-8175

---

**From:** MacDonald, Jennifer  
**Sent:** March-12-18 1:03 PM  
**To:** Bowlby, Heather; Joyce, Warren  
**Subject:** White Shark permit questions

Hi Heather and Warren,

I am continuing to work on the OCEARCH permit application and had a few outstanding questions that I was hoping you could advise on.

I remember in our last meeting, we discussed potentially restricting the size of sharks that could be caught. I had written down somewhere that we would restrict it to between 13 and 18 feet in total length, but I don't think that was right. Would you suggest that such a condition be included in the permit and if so, what would be your suggestion for the appropriate size?

I have also drafted a condition in the permit that requires further tagging be ceased if there is a mortality or significant injury during a tagging attempt (until further instructed by DFO). [REDACTED]

[REDACTED]

Thanks so much,  
Jenn

**Jennifer MacDonald**

Species at Risk Biologist | Biologiste des espèces en péril  
Species at Risk Management Division | Division de la gestion des espèces en péril  
Ecosystem Management | Gestion des écosystèmes  
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# Does transmitter placement or species affect detection efficiency of tagged animals in biotelemetry research?

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## ARTICLE INFO

### Article history:

Received 27 October 2015

Received in revised form 1 April 2016

Accepted 10 May 2016

Handled by B. Arara

Available online 31 May 2016

### Keywords:

Acoustic telemetry

Ultrasonic telemetry

Animal movement

Tagging method

Detection range test

Animal tracking

## ABSTRACT

Acoustic telemetry has quickly become a powerful tool for ecological research in aquatic systems, yet our knowledge of in situ transmitter performance remains limited. Here, we used an experimental approach to test the influence of three biotic factors on the detection range of acoustic transmitters: (1) internal versus external placement of the transmitter on a model finfish species, red drum (*Sciaenops ocellatus*); (2) attachment of a transmitter on an animal host (red drum) versus a fixed object; and (3) species comparison between internally tagged red drum and southern flounder (*Paralichthys lethostigma*). Significant differences in detection probability were observed between internally and externally placed transmitters as well as between transmitters attached to an animal host (red drum) and those attached to a fixed line, while no effect was observed between the two species tested. External transmitters were detected significantly more than corresponding internal transmitters in red drum, and outperformed internal transmitters by 2–7 fold at distances >100m. Similarly, detection probability declined more quickly as a function of distance for transmitters attached to red drum relative to transmitters attached to a fixed line, with greater differences observed at distances >300m. Findings from this study challenge commonly held assumptions in acoustic telemetry research and suggest that traditional range testing methods are likely to considerably overestimate detection range of tagged animals in situ. Accounting for the influence of transmitter placement will enhance study design in acoustic telemetry research and ultimately improve detection efficiency and data interpretation in animal movement studies.

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## 1. Introduction

The study of animal movement is rapidly increasing amid growing efforts to assess the effects of habitat loss/fragmentation and climate change on animal distributions (Nathan et al., 2008; Schick et al., 2008). Animal movement patterns can provide researchers with a better understanding of how animals interact with their environment across a range of spatial and temporal scales (Morales and Ellner, 2002; Patterson et al., 2008; Morales et al., 2010). In recent years, technological advances in biotelemetry and geographic information systems have greatly improved our ability to track animals and relate patterns of movement to their environment (Cooke et al., 2004; Cagnacci et al., 2010; Hussey et al., 2015). Although the study of animal movement has progressed rapidly in a relatively short period of time, studies identifying potential

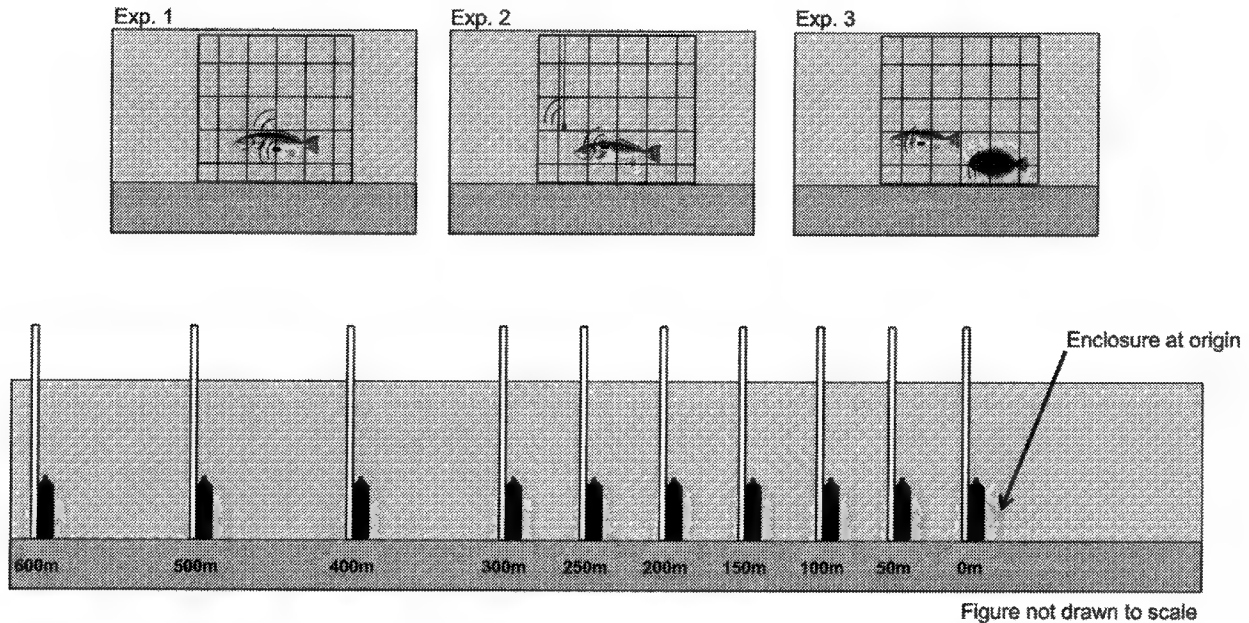
uncertainty and limitations associated with animal tracking technologies are lacking and are needed to improve interpretations of movement data (Frair et al., 2010; Fieberg et al., 2010).

The ability of researchers to characterize animal movements is considerably impaired in aquatic systems, and acoustic telemetry has quickly become a powerful tool to examine movement patterns of marine and freshwater taxa (i.e. fishes, crustaceans, cephalopods, mammals) (Donaldson et al., 2014; Hussey et al., 2015). Acoustic receivers can be deployed in a variety of configurations to address different research questions and range in size from small arrays to examine site fidelity to a particular habitat, to mesoscale gridded arrays for estimating home range and activity spaces across larger water bodies (i.e. bays, lakes), to widely dispersed receiver lines (i.e. curtains or gates) deployed at intervals along a coast or river to monitor fish passage associated with broad movements or migrations (see Heupel et al., 2006). In addition, recent advancements have given researchers the ability to deploy high-density arrays of receivers with overlapping listening areas (acoustic positioning systems) to triangulate animal positions and

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**Fig. 1.** Schematic of experimental design, which consisted of a 1-m<sup>3</sup> enclosure and a line of acoustic receivers secured to polyvinyl chloride (PVC) moorings at set distances from the enclosure (0, 50, 100, 150, 200, 250, 300, 400, 500, 600m). In the first experiment (Exp. 1) red drum were simultaneously fitted with an internal and external transmitter. In the second experiment (Exp. 2), red drum were fitted with an external transmitter and a second transmitter was attached to a fixed monofilament line. In the third experiment (Exp. 3) both a red drum and southern flounder were fitted with an internal transmitter. Distances and sizes are not drawn to scale.

provide fine-scale animal tracks (Espinoza et al., 2011; Grothues et al., 2012; Capello et al., 2013; Furey et al., 2013). Despite the sharp increase in acoustic telemetry studies over the last decade (Kessel et al., 2014), our understanding of the range at which receivers can detect transmitters is still surprisingly limited. This discrepancy between application and understanding can lead to poorly designed receiver configurations and ultimately misinterpretation of acoustic telemetry data (Payne et al., 2010; Gjelland and Hedger, 2013).

A variety of factors can affect the ability of acoustic receivers to detect transmitters including environmental and meteorological conditions (Gjelland and Hedger, 2013), ambient noise (Welsh et al., 2012), biofouling (Heupel et al., 2008), transmitter type/power (How and de Lestang, 2012; Cagua et al., 2013), depth (Gjelland and Hedger, 2013), and diel (Payne et al., 2010) or tidal (Mathies et al., 2014) cycles. The influence of many of these factors varies across systems, and thus it is generally recommended that researchers conduct range tests within a study site prior to and/or during a study to estimate the distance from a receiver that a tag can be reliably detected within an array (Heupel et al., 2006; Payne et al., 2010). The majority of range tests are aimed at determining the impact of environmental variables, and therefore detection range is typically estimated from fixed transmitters in water despite the fact that the most common method of attachment for fish is to surgically implant the transmitter into the coelomic cavity rather than attaching it externally (Cooke et al., 2011; Johnson et al., 2015). Thus, range tests are largely conducted under the assumption that transmitter performance in water will not differ from transmitter performance when internally implanted within or externally attached to the host animal (Kessel et al., 2014). Moreover, if the body wall of the tagged animal does indeed affect transmission, it might then be further expected that these effects would be dependent upon body morphology. Nevertheless, the effect the tagged organism (or tagging method) has on detection range of acoustic transmitters is poorly understood.

Here we utilize an experimental approach to test the effects of three biotic factors affecting acoustic telemetry studies. We first

examined the effect of transmitter placement (internal vs. external) on detection range of a common estuarine finfish, red drum (*Sciaenops ocellatus*). Next, we assessed the impact of the host animal (red drum) on detection range by comparing detection range of a transmitter fixed to a line to that of a transmitter attached to an animal. Lastly, we compared detection range of internal transmitters in red drum to another common estuarine fish that differs in body type, southern flounder (*Paralichthys lethostigma*), which has a laterally compressed body ("flatfish").

## 2. Materials and methods

Experiments were conducted between February and December 2013 in Galveston Bay, a large estuary in the northern Gulf of Mexico. Benthic structure of the study site was homogenous, and characterized by bare sand substrate and relatively uniform depth [ $1.02 \pm 0.03$  m (mean  $\pm$  SE)]. Tagged fish and transmitters used in experiments were placed inside a 1-m<sup>3</sup> enclosure comprised of a polyvinyl chloride (PVC) frame and plastic mesh that was secured to a PVC pole at the origin of a line of receivers (Vemco VR2W,  $n = 10$ ) attached to fixed (PVC) moorings located 0, 50, 100, 150, 200, 250, 300, 400, 500, and 600 m from the enclosure (Fig. 1). This structure allowed for movement of tagged individuals within a restricted area to account for some natural variability in detection probability due to fish movement and orientation, while also controlling for transmitter location and preventing predation. The order of receivers was randomized for each replicate trial to reduce the effects of individual receiver performance on detection range (Heupel et al., 2008).

Red drum was chosen as a model fish species and was used in all three experiments, while southern flounder was used as a contrasting species in the third experiment. Both species have been previously used in telemetry studies (Furey et al., 2013; Fodrie et al., 2015; Dance and Rooker, 2015) and co-occur over much of their range. Individuals were captured via hook and line and held in 1.7 m<sup>3</sup> tanks at the Texas A&M University Sea Life Center. Fish were anaesthetized with clove oil prior to tagging and fitted with Vemco

**Table 1**

Mean difference ( $\pm$ SE) in detection probability as a function of distance between paired samples for three experiments testing biotic factors influencing detection efficiency of acoustic transmitters: (1) Ext-Int (difference between paired external and internal transmitters on red drum), (2) Fix-RD (difference between transmitter attached to a fixed line and transmitter externally attached to a red drum), (3) SF-RD (difference between transmitters internally implanted in southern flounder and red drum). Asterisks represent significant differences at  $\alpha = 0.05$  (paired *t*-test;  $P < 0.05$ ), while *q*-values represent *p*-values adjusted to control the false discovery rate (also set at 0.05). Effect size is given as Cohen's *d* (*d*), where the corresponding effect size magnitudes using the thresholds defined in Cohen (1992) are: negligible ( $|d| < 0.2$ ), small ( $0.2 < |d| < 0.5$ ), medium ( $0.5 < |d| < 0.8$ ), large ( $|d| > 0.8$ ). Large effect sizes are indicated with bold font. Experiment 3 was only conducted between 0 and 400 m.

Distance	Experiment 1			Experiment 2			Experiment 3		
	Ext-Int	<i>q</i>	<i>d</i>	Fix-RD	<i>q</i>	<i>d</i>	SF-RD	<i>q</i>	<i>d</i>
50 m	0.06 (0.03)	0.11	<b>1.33</b>	0.00 (0.02)	0.81	−0.35	0.01 (0.01)	0.56	<b>0.52</b>
100 m	0.35 (0.13)	0.07	<b>1.68</b>	0.01 (0.04)	0.81	0.29	0.11 (0.06)	0.56	<b>0.79</b>
150 m	<b>0.48 (0.13)*</b>	0.03	<b>2.64</b>	<b>0.04 (0.06)</b>	0.32	<b>1.55</b>	0.13 (0.13)	0.71	<b>0.49</b>
200 m	<b>0.57 (0.09)*</b>	0.02	<b>3.14</b>	0.14 (0.09)	0.32	<b>1.74</b>	0.06 (0.14)	<b>0.98</b>	<b>0.16</b>
250 m	<b>0.60 (0.14)*</b>	0.03	<b>2.34</b>	0.17 (0.1)	0.34	<b>1.64</b>	0.00 (0.11)	<b>0.98</b>	<b>0.01</b>
300 m	<b>0.64 (0.11)*</b>	0.02	<b>3.19</b>	<b>0.23 (0.08)*</b>	0.20	<b>3.10</b>	−0.01 (0.09)	<b>0.98</b>	<b>−0.03</b>
400 m	<b>0.51 (0.12)*</b>	0.03	<b>1.99</b>	0.26 (0.15)	0.28	<b>1.99</b>	−0.04 (0.04)	0.71	<b>−0.46</b>
500 m	<b>0.50 (0.14)*</b>	0.03	<b>1.87</b>	<b>0.24 (0.12)*</b>	0.20	<b>1.62</b>			
600 m	<b>0.31 (0.09)*</b>	0.03	<b>1.66</b>	0.22 (0.11)	0.20	<b>1.19</b>			

V9-1H coded transmitters (69 kHz, 9 mm diameter  $\times$  24 mm length, 151 dB) with a nominal delay of 15 s (range 10–20 s). V9 transmitters are commonly used to study movement patterns of fishes and invertebrates in a range of systems (e.g. Welch et al., 2011; Bloor et al., 2013; McMahan et al., 2013). External tagging followed a protocol modified from Furey et al. (2013) in which each transmitter was fixed to a vinyl Peterson disc tag (FloyTag Inc) with heat shrink wrap and mounted to the dorsal musculature of the fish. Two sterilized nickel pins held in place by another vinyl Peterson disc tag were passed through the dorsal musculature and secured to the vinyl disc tag holding the transmitter with rubber earring backings and a metal crimping sleeve. Internal transmitters were surgically implanted into the coelomic cavity via a small ventral incision and closed with one or two interrupted sutures (4-0 Ethicon vicryl). Overall, six V9-1H transmitters were used in the study and transmitter pairings for each trial were rotated to minimize the effect of any individual transmitter on detection range.

To test the effect of internal versus external placement on transmitter performance, we conducted replicate trials on five consecutive days with similar environmental conditions. Prior to each trial, a single red drum (55.9  $\pm$  1.5 cm; mean  $\pm$  SE) was fitted with both an internal and external V9-1H transmitter and placed in the field enclosure after a recovery period (minimum 1 h). Receivers (random order) were then deployed at the fixed moorings located at set distances from the enclosure (see Fig. 1). Data were recorded for approximately three hours, after which the fish and receivers were recovered and data were uploaded. Five V9-1H transmitters were used for this experiment and the pairing of transmitters used in each trial was unique. No transmitter was used more than twice as either an internal or external transmitter.

The second experiment tested for differences in detection range between transmitters on an animal host (red drum) and attached to a fixed line. This experiment followed a similar procedure to the first, with the exception that red drum (TL: 55.0  $\pm$  3.0 cm) were fitted with only an external transmitter and placed in the enclosure with a fixed transmitter that was suspended from the top of the enclosure via monofilament line 0.5 m above the substrate (Fig. 1). A unique red drum was used for each of the three replicate trials, with receiver order and transmitters again randomized for each trial. Because we were unable to conduct this experiment on consecutive days, each trial lasted 24 h to account for variability in weather conditions and daily cycles (tide, day/night) among replicates ( $n = 3$ ).

The third experiment tested for differences in detection range between red drum and southern flounder, two species that differ in body morphology. Prior to each trial, a red drum (39.8  $\pm$  4.5 cm; total length  $\pm$  SE) and southern flounder (39.8  $\pm$  2.9 cm) of simi-

lar size were fitted with internal transmitters and placed in the enclosure (Fig. 1). The rest of the trial followed a similar procedure described previously for the other two experiments, with the exception that detection range was tested to 400 m (set distances of: 0, 50, 100, 150, 200, 250, 300, 400 m) rather than 600 m. Different red drum and southern flounder were used for each of five replicate trials, with receiver order and transmitters randomized before each trial. Similar to the second experiment, we were unable to conduct the experiment on consecutive days, and therefore, we used 24-h time periods to account for variability in weather conditions and daily cycles among days.

Transmitter detections recorded per receiver during each trial were converted to a detection probability by dividing the number of detections at a given receiver by the number of detections recorded by the receiver at the origin (0 m). This methodology was used rather than dividing by the theoretical number of transmissions to eliminate transmissions not detected by receivers due to acoustic collisions (Heupel et al., 2006). Mean collision rate across all experiments (46.3  $\pm$  0.7%; mean  $\pm$  SE) was nearly identical to the predicted collision rate (for two transmitters with a 15 s nominal delay) of 46.5%, and no significant differences in collision rate were observed between treatments in experimental trials (paired *t*-test,  $P > 0.05$ ). Analysis of covariance (ANCOVA) was used to test the variation in the relationship between detection probability and distance among treatment groups for each of the three experiments. Detection probability was the dependent variable for each ANCOVA model with transmitter treatment as the independent variable and distance from transmitter as the covariate. In each case, preliminary models were run first (slopes test, interaction regression) to determine if slopes of the regression lines differed between treatments. The main effects test of the ANCOVA (*y*-intercept) was only performed for experiments in which the assumption of parallel slopes was met. Mean differences in detection probability between paired samples in each experiment were assessed with paired *t*-tests to determine the magnitude and specific distances at which differences occurred in each experiment. Adjusted *p*-values (*q*-value) were used to control the false discovery rate (FDR) at  $\alpha = 0.05$  (Benjamini and Hochberg, 1995), which is the preferred adjustment to correct for multiple comparisons in ecological studies (Nakagawa, 2004; Pike, 2011). Although it is generally acceptable to use the uncorrected *p*-value in this case, given that each comparison tested a different distance-specific null hypothesis (Cabin and Mitchell, 2000), we present both corrected and uncorrected values. We then calculated effect size for each paired comparison using Cohen's *d* (Cohen, 1992) to examine the magnitude of the treatments tested, where effect size magnitudes are: negligible ( $d < 0.2$ ), small ( $d = 0.2$ – $0.5$ ), medium ( $d = 0.5$ – $0.8$ ), and large ( $d > 0.8$ ).

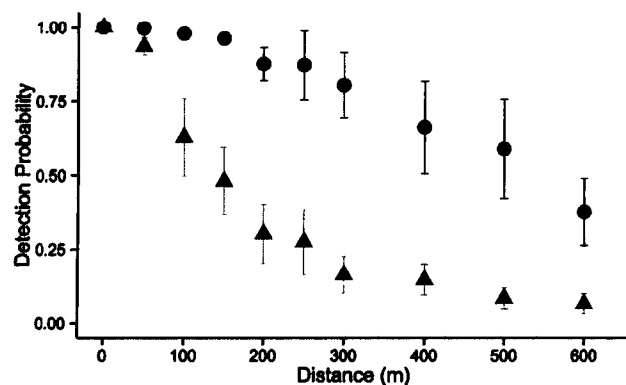


Fig. 2. Mean detection probability as a function of distance for external (●) and internal (▲) transmitters simultaneously attached to red drum. Error bars are  $\pm 1$  SE of the mean from five replicate trials.

### 3. Results

Detection probability declined with increasing distance from transmitter for all experiments. Mean detection probability was significantly greater for external transmitters than internal transmitters (ANCOVA y-intercept;  $P < 0.001$ ), and ranged from 1.00 (50 m) to 0.38 (600 m) for external transmitters compared to 0.93 (50 m) to 0.07 (600 m) for internal transmitters. External transmitters outperformed internal transmitters in paired comparisons at all distances in every trial (see Table 1, Fig. 2), and mean differences in detection probability between paired external/internal transmitters at each distance ranged from a minimum of 0.06 at 50 m to a maximum of 0.64 at 300 m. Differences in detection probability were significant between treatment pairs at all distances greater than 100 m (paired  $t$ -tests;  $P < 0.05$ ), with external transmitters detected 2–7 times more frequently at these distances (Fig. 2). While large effect sizes were observed for all comparisons (Cohen's  $d > 1.3$ ), smaller but consistent differences in detection probability between internal/external pairs at 50 m (mean difference = 0.06) and 100 m (0.35) were not significant (paired  $t$ -tests;  $P > 0.05$ ).

The rate of decline in detection probability as a function of distance differed between transmitters attached to an animal host (red drum) and those attached to fixed line (ANCOVA slopes test;  $P < 0.01$ ), with transmitters on red drum detected less frequently as distance increased. Mean detection probability ranged from 1.00 (50 m) to 0.47 (600 m) for transmitters attached to the line, and from 1.00 (50 m) to 0.25 (600 m) for transmitters externally attached to red drum. While transmitters performed

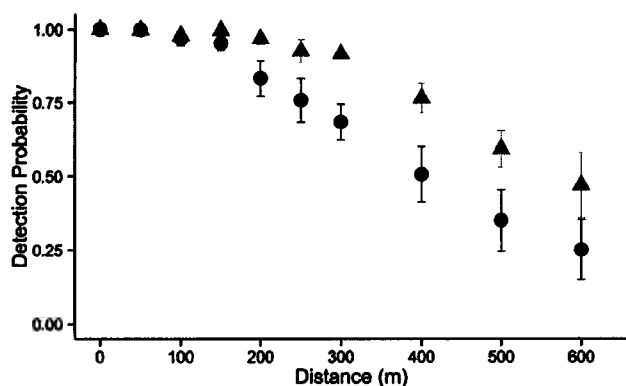


Fig. 3. Mean detection probability as a function of distance for transmitters attached to a fixed line (▲) and externally to red drum (●). Error bars are  $\pm 1$  SE of the mean from three replicate trials.

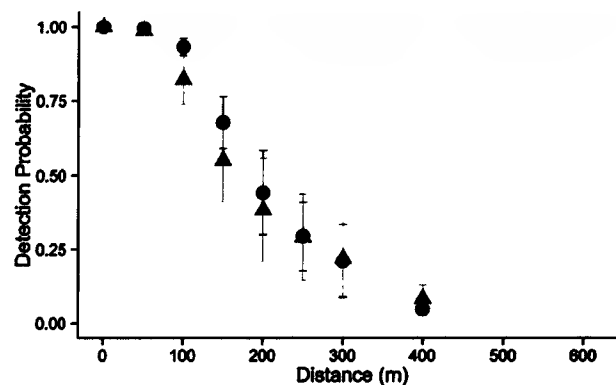


Fig. 4. Mean detection probability as a function of distance for transmitters internally implanted in southern flounder (●) and red drum (▲). Error bars are  $\pm 1$  SE of the mean from five replicate trials.

similarly between treatments from 50–150 m (mean paired difference  $< 0.05$  m), transmitters attached to the line were consistently detected more frequently than transmitters on red drum at distances greater than 150 m (range: 0.14–0.26, Table 1, Fig. 3). We also observed very large effect sizes at most distances ( $d > 1.5$ ), yet despite the magnitude of these differences, paired comparisons at each distance indicated that transmitter treatments were significantly different at only two distances: 300 m and 500 m (paired  $t$ -tests;  $P < 0.05$ ), and no differences were detected at any distance after controlling for FDR ( $q > 0.05$ ) (Table 1).

Red drum and southern flounder were used as model species to test for species-specific differences in detection range. Detection probability for transmitters internally placed in red drum and southern flounder did not differ statistically (ANCOVA y-intercept test;  $P > 0.05$ ). Mean detection probability ranged from 0.99 (50 m) to 0.08 (400 m) for red drum and from 0.99 (50 m) to 0.05 (400 m) for southern flounder. Examination of differences in paired treatments indicated that transmitters placed in southern flounder were often detected more frequently at closer receivers ( $< 150$  m) than transmitters placed in red drum (Table 1, Fig. 4). However, differences in detection probability between the two species were variable across the 5 trials, and no significant differences in detection probability were found at any distance (paired  $t$ -tests;  $P > 0.05$ ).

### 4. Discussion

Here we demonstrate that the placement of acoustic transmitters affects their performance, with detection probabilities of external transmitters on red drum being 2–7 fold higher than internal transmitters at receiver distances  $> 100$  m. This finding suggests that intracoelomic implantation of acoustic transmitters in fish may reduce the detection range of transmitters. Our results are in accord with previous studies that reported reductions in detection efficiency and/or signal strength associated with internal transmitters in both radio-telemetered finfish (Cooke and Bunt, 2001) and acoustically-tagged cuttlefish (Jackson et al., 2005). In fact, cuttlefish simultaneously tagged with internal and external transmitters were detected four times more efficiently with the external transmitter (Jackson et al., 2005), which is similar to our findings and suggests that signal attenuation likely occurs at a higher rate for acoustic transmitters placed inside the body cavity of the host species.

While the exact mechanism of signal attenuation is unknown, submerged aquatic vegetation, biofouling, mineralized hard parts, and several different biological tissues have all been shown to reduce the detectability of acoustic transmissions (Jackson et al., 2005; Heupel et al., 2008; Wilson et al., 2013). Still, any reduction

in detection range caused by intracoelomic implantation of acoustic transmitters is widely assumed to be negligible because the density and sound properties of animal tissues are thought to be similar to that of water (Kessel et al., 2014). This may be true for tissues with high water content, as acoustic attenuation is negatively correlated to tissue water content and those tissues with high water content are more likely to have similar sound properties to water (Olerud et al., 1990). However, attenuation is positively correlated with collagen concentration in tissue (O'Brien, 1977; Olerud et al., 1990; Mast, 2000), and therefore we might expect tissues with higher collagen content such as bones, tendons, and fish scales to have higher acoustic impedance (Pohlhammer and O'Brien, 1980), potentially increasing signal attenuation from transmitters placed in the body cavity of the host animal. While we cannot unequivocally determine the direct cause of the observed reduced detection range for internal transmitters in this study, the consistent and substantial difference in detection probability between internal and external transmitters across a range of distances suggests that traditional range tests of transmitters, which are often performed by attaching the transmitter to a fixed structure, will overestimate the detection range of surgically implanted transmitters.

The detectability of acoustic transmitters can also be influenced by the behavior of the study animal (Heupel et al., 2006; Grothues et al., 2012), and therefore the movement or orientation of a tagged animal may likewise impact detection range. Our second experiment showed that detection probability declined more rapidly for transmitters attached to an animal host relative to transmitters attached to a fixed line. This finding suggests that attaching transmitters to fixed or stationary objects during range tests may not accurately represent the detection range of externally tagged animals in situ. Coupling this result with findings from our first experiment showing reduced performance for internally placed transmitters, it is likely that conventional range testing (i.e., transmitter attached to a nonliving object) considerably overestimates the detection range achieved for internally tagged fish or other animal hosts. In the current study, tagged red drum were free to move within a limited area inside the experimental enclosure, and observed differences in detection probability between transmitters attached to red drum and the fixed line were likely reflective of red drum movement or orientation within the enclosure. Similarly, other studies have shown that animal orientation or transmitter movement can negatively affect the accuracy of acoustic telemetry systems (Espinoza et al., 2011; Grothues et al., 2012).

Given the observed reduction in detection range for internal acoustic transmitters in the first experiment, it might be expected that variation in body type between red drum and southern flounder would lead to differences in transmitter performance. Multi-species acoustic telemetry studies are increasingly utilized to examine species interactions (Speed et al., 2011; McMahan et al., 2013; Dance and Rooker, 2015; Hussey et al., 2015), and the ability to make comparisons between or among species is dependent on the assumption that internal transmitters perform similarly among species. In the current study, we observed that detection range was statistically similar between these two species even though their body types differ markedly, suggesting that species-specific differences in detection range may be minimal. This was surprising given that the body wall of a red drum is significantly thicker than that of a southern flounder (Dance, 2016), and makes it seem unlikely that the thickness of the body wall is the sole mechanism reducing detection range of internal transmitters relative to externally attached transmitters. Although we did not detect differences between red drum and southern flounder, it is possible that we were unable to detect differences that may actually occur in situ due to behavioral differences. The enclosure likely precluded fish from natural behaviors (i.e. active swimming, burying, association

with submerged aquatic vegetation, etc.) that could affect transmitter performance (see Grothues et al., 2012), reducing our ability to detect behavior related differences. Future studies that examine the influence of swimming speed, position in the water column, or habitat preference on detection range would be beneficial to our understanding of the impacts of species-specific behavior on transmitter performance.

A variety of factors can affect the detection range of acoustic transmitters (Kessel et al., 2014), and it is possible that relationships described here could vary across different transmitter types or ecosystems. Previous studies have shown that transmitter type and power output impacts detection range (How and de Lestang, 2012), and thus it is possible that transmitters with a higher or lower power output than those used in this study may not respond in the same manner. Nonetheless, the conspicuous difference in detection range for internal and external transmitters presented here suggest a similar effect is likely for other transmitter types (i.e. power outputs), although further testing would be needed to determine the magnitude of this effect. Detection range for our transmitters attached to a fixed line (>50% detection probability at 500 m) was comparable to or exceeded reported detection ranges (150–500 m) for fixed transmitters of similar power output in previous estuarine or coastal studies (Chittenden et al., 2008; Sulak et al., 2009; Francis, 2013) and far exceeded that of transmitters in reef systems (50–150 m) (How and de Lestang, 2012; Welsh et al., 2012). Because detection range can vary across systems of varying complexity and depth (i.e. reefs, coastal, riverine, offshore), there may be variability in the magnitude of the effects of the host animal on detection range. However, comparisons to previous studies also suggest that our system may represent a favorable acoustic environment and the reduction in detection range associated with transmitter placement shown here could be conservative relative to systems with greater influence from environmental factors that attenuate acoustic signals (e.g. noise, wind/sea surface variability, depth).

Our results highlight the value of in situ range testing using animal hosts and suggest that the use of external transmitters may be beneficial, depending on the research aims of the study, as it will likely improve detection range. Still, the use of internal transmitters is often advantageous to other research goals (i.e. increased study duration) and intracoelomic implantation remains the most common attachment method in fish. Therefore, in such instances, researchers should consider range testing with an internally tagged animal to provide the most realistic estimates of detection range for transmitters in situ. Because it is not always feasible to use animals during range testing, caution should be used when interpreting traditional range tests, particularly during the planning phase of studies that deploy arrays such as curtains, gates, and acoustic positioning systems that rely on receiver spacing to effectively cover an area of interest (see Heupel et al., 2006; Espinoza et al., 2011). Overestimating detection range can lead to inadequate receiver spacing and reduced detection efficiency, ultimately impairing the ability of researchers to detect movement patterns, fish passage, and fish-habitat relationships. As a result, there is increased potential for animals to be present but not detected within acoustic arrays, which can lead to spurious conclusions such as reduced home range or residency estimates, underestimation of connectivity among locales, and/or overestimation of mortality in migration studies (if detection efficiency is not estimated from the study animals directly; i.e. Welsh et al., 2011 and Clark et al., 2016). Given the increasing use of acoustic telemetry as a tool to monitor animal movements in aquatic environments, there is a need to improve range testing procedures to more accurately predict in situ transmitter performance and minimize methodological errors.

## Acknowledgements

We would like to thank D. Sohns, L. Randall, K. Dance, and T. Tin-Han for their assistance in the field as well as J. Simms and C. Macon for their contribution in the field to earlier iterations of this project. We would also like to thank C. Marshall as well as four anonymous reviewers for comments and suggestions that improved the quality and clarity of this manuscript.

## References

- Benjamini, Y., Hochberg, Y., 1995. Controlling the false discovery rate: a practical and powerful approach to multiple testing. *J. R. Stat. Soc. Ser. B (Methodological)* 57, 289–300.
- Bloor, I.S.M., Wearmouth, V.J., Cotterell, S.P., McHugh, M.J., Humphries, N.E., Jackson, E.L., Attrill, M.J., Sims, D.W., 2013. Movements and behaviour of European common cuttlefish *Sepia officinalis* in English Channel inshore waters: first results from acoustic telemetry. *J. Exp. Mar. Biol. Ecol.* 448, 19–27.
- Cabin, R.J., Mitchell, R.J., 2000. To bonferroni or not to bonferroni: when and how are the questions. *Bull. Ecol. Soc. Am.* 81, 246–248.
- Cagnacci, F., Boitani, L., Powell, R.A., Boyce, M.S., 2010. Animal ecology meets GPS-based radiotelemetry: a perfect storm of opportunities and challenges. *Philos. Trans. R. Soc. B* 365, 2157–2162.
- Cagua, E.F., Berumen, M.L., Tyler, E.H.M., 2013. Topography and biological noise determine acoustic detectability on coral reefs. *Coral Reefs* 32, 1123–1134.
- Capello, M., Soria, M., Potin, G., Cotel, P., Dagorn, L., 2013. Effect of current and daylight variations on small-pelagic fish aggregations (*Selar crumenophthalmus*) around a coastal fish aggregating device studied by fine-scale acoustic tracking. *Aquat. Living Res.* 26, 63–68.
- Chittenden, C.M., Sura, S., Butterworth, K.G., Cubitt, K.F., Plantalech Manel-la, N., Balfry, S., Økland, F., McKinley, R.S., 2008. Riverine, estuarine and marine migratory behaviour and physiology of wild and hatchery-reared coho salmon *Oncorhynchus kisutch* (Walbaum) smolts descending the Campbell River, BC, Canada. *J. Fish Biol.* 72, 614–628.
- Clark, T.D., Furey, N.B., Rechisky, E.L., Gale, M.K., Jeffries, K.M., Porter, A.D., Hinch, S.G., 2016. Tracking wild sockeye salmon smolts to the ocean reveals distinct regions of nocturnal movement and high mortality. *Ecol. Appl.*, <http://dx.doi.org/10.1890/1556-8113.123>.
- Cohen, J., 1992. A power primer. *Psychol. Bull.* 112, 155–159.
- Cooke, S.J., Bunt, C.M., 2001. Assessment of internal and external antenna configurations of radio transmitters implanted in smallmouth bass. *N. Am. J. Fish. Manag.* 21, 236–241.
- Cooke, S.J., Hinch, S.G., Wikelski, M., Andrews, R.D., Kuchel, I.J., Wolcott, T.G., Butler, P.J., 2004. Biotelemetry: a mechanistic approach to ecology. *Trends Ecol. Evol.* 19, 334–343.
- Cooke, S., Woodley, C., Brad Eppard, M., Brown, R., Nielsen, J., 2011. Advancing the surgical implantation of electronic tags in fish: a gap analysis and research agenda based on a review of trends in intracoeleomic tagging effects studies. *Rev. Fish Biol. Fish.* 21, 127–151.
- Dance, M.A., Rooker, J.R., 2015. Habitat- and bay-scale connectivity of sympatric fishes in an estuarine nursery. *Estuar. Coast. Shelf Sci.* 167, 447–457.
- Dance, M.A., 2016. Spatio-temporal variability in movement and habitat associations of juvenile fishes in estuarine seascapes. In: PhD Dissertation. Texas A&M University, College Station, TX, USA.
- Donaldson, M.R., Hinch, S.G., Suski, C.D., Fisk, A.T., Heupel, M.R., Cooke, S.J., 2014. Making connections in aquatic ecosystems with acoustic telemetry monitoring. *Front. Ecol. Environ.* 12, 565–573.
- Espinoza, M., Farrugia, T.J., Webber, D.M., Smith, F., Lowe, C.G., 2011. Testing a new acoustic telemetry technique to quantify long-term: fine-scale movements of aquatic animals. *Fish. Res.* 108, 364–371.
- Fieberg, J., Matthiopoulos, J., Hebblewhite, M., Boyce, M.S., Frair, J.L., 2010. Correlation and studies of habitat selection: problem, red herring or opportunity? *Philos. Trans. R. Soc. B* 365, 2233–2244.
- Fodrie, F.J., Yeager, L., Grabowski, J., Layman, C., Sherwood, G., Kenworthy, M., 2015. Measuring individuality in habitat use across complex landscapes: approaches, constraints, and implications for assessing resource specialization. *Oecologia* 178, 75–87.
- Frair, J.L., Fieberg, J., Hebblewhite, M., Cagnacci, F., DeCesare, N.J., Pedrotti, L., 2010. Resolving issues of imprecise and habitat-biased locations in ecological analyses using GPS telemetry data. *Philos. Trans. R. Soc. B* 365, 2187–2200.
- Francis, M.P., 2013. Temporal and spatial patterns of habitat use by juveniles of a small coastal shark (*Mustelus lenticulatus*) in an estuarine nursery. *PLoS One* 8, e57021.
- Furey, N.B., Dance, M.A., Rooker, J.R., 2013. Fine-scale movements and habitat use of juvenile southern flounder *Paralichthys lethostigma* in an estuarine seascape. *J. Fish Biol.* 82, 1469–1483.
- Gjelland, K.O., Hedger, R.D., 2013. Environmental influence on transmitter detection probability in biotelemetry: developing a general model of acoustic transmission. *Methods Ecol. Evol.* 4, 665–674.
- Grothues, T.M., Able, K.W., Pravatiner, J.H., 2012. Winter flounder (*Pseudopleuronectes americanus* Walbaum) burial in estuaries: acoustic telemetry triumph and tribulation. *J. Exp. Mar. Biol. Ecol.* 438, 125–136.
- Heupel, M.R., Semmens, J.M., Hobday, A.J., 2006. Automated acoustic tracking of aquatic animals: scales: design and deployment of listening station arrays. *Mar. Freshw. Res.* 57, 1–13.
- Heupel, M.R., Reiss, K.L., Yeiser, B.G., Simpfendorfer, C.A., 2008. Effects of biofouling on performance of moored data logging acoustic receivers. *Limnol. Oceanogr. Methods* 6, 327–335.
- How, J.R., de Lestang, S., 2012. Acoustic tracking: issues affecting design: analysis and interpretation of data from movement studies. *Mar. Freshw. Res.* 63, 312–324.
- Hussey, N.E., Kessel, S.T., Aarestrup, K., Cooke, S.J., Cowley, P.D., Fisk, A.T., Harcourt, R.G., Holland, K.N., Iverson, S.J., Kocik, J.F., Mills Flemming, J.E., Whoriskey, F.G., 2015. Aquatic animal telemetry: a panoramic window into the underwater world. *Science* 348, 1255642.
- Jackson, G.D., O'Dor, R.K., Andrade, Y., 2005. First tests of hybrid acoustic/archival tags on squid and cuttlefish. *Mar. Freshw. Res.* 56, 425–430.
- Johnson, M.J., Diamond, S.L., Stunz, G.W., 2015. External attachment of acoustic tags to deepwater reef fishes: an alternate approach when internal implantation affects experimental design. *Trans. Am. Fish. Soc.* 144, 851–859.
- Kessel, S.T., Cooke, S.J., Heupel, M.R., Hussey, N.E., Simpfendorfer, C.A., Vagle, S., Fisk, A.T., 2014. A review of detection range testing in aquatic passive acoustic telemetry studies. *Rev. Fish Biol. Fish.* 24, 199–218.
- Mast, T.D., 2000. Empirical relationships between acoustic parameters in human soft tissues. *Acoust. Res. Lett.* 1, 37–42.
- Mathies, H., Ogburn, M.B., McFall, G., Fangman, S., 2014. Environmental interference factors affecting detection range in acoustic telemetry studies using fixed receiver arrays. *Mar. Ecol. Prog. Ser.* 495, 27–38.
- McMahan, M.D., Brady, D.C., Cowan, D.F., Grabowski, J.H., Sherwood, G.D., 2013. Using acoustic telemetry to observe the effects of a groundfish predator (Atlantic cod: *Gadus morhua*) on movement of the American lobster (*Homarus americanus*). *Can. J. Fish. Aquat. Sci.* 70, 1625–1634.
- Morales, J.M., Ellner, S.P., 2002. Scaling up animal movements in heterogeneous landscapes: the importance of behavior. *Ecology* 83, 2240–2247.
- Morales, J.M., Moorcroft, P.R., Matthiopoulos, J., Frair, J.L., Kie, J.G., Powell, R.A., Merrill, E.H., Haydon, D.T., 2010. Building the bridge between animal movement and population dynamics. *Philos. Trans. Roy. Soc. B* 365, 2289–2301.
- Nakagawa, S., 2004. A farewell to Bonferroni: the problems of low statistical power and publication bias. *Behav. Ecol.* 15, 1044–1045.
- Nathan, R., Getz, W.M., Revilla, E., Holyoak, M., Kadmon, R., Saltz, D., Smouse, P.E., 2008. A movement ecology paradigm for unifying organismal movement research. *Proc. Natl. Acad. Sci. U. S. A.* 105, 19052–19059.
- O'Brien Jr., W.D., 1977. The role of collagen in determining ultrasonic propagation properties in tissue. In: Kessler, L. (Ed.), *Acoustical Holography*. Springer, US, pp. 37–50.
- Olerud, J.E., O'Brien Jr., W.D., Riederer-Henderson, M.A., Steiger, D.L., Debel, J.R., Odland, G.F., 1990. Correlation of tissue constituents with the acoustic properties of skin and wound. *Ultrasound Med. Biol.* 16, 55–64.
- Patterson, T.A., Thomas, L., Wilcox, C., Ovaskainen, O., Matthiopoulos, J., 2008. State-space models of individual animal movement. *Trends Ecol. Evol.* 23, 87–94.
- Payne, N.L., Gillanders, B.M., Webber, D.M., Semmens, J.M., 2010. Interpreting diel activity patterns from acoustic telemetry: the need for controls. *Mar. Ecol. Prog. Ser.* 419, 295–301.
- Pike, N., 2011. Using false discovery rates for multiple comparisons in ecology and evolution. *Methods Ecol. Evol.* 2, 278–282.
- Pohlhammer, J.D., O'Brien Jr., W.D., 1980. The relationship between ultrasonic attenuation and speed in tissues and the constituents: water, collagen, protein, and fat. In: Fullerton, J.D., Zagzebski, Z. (Eds.), *Medical Physics of CT and Ultrasound: Tissue Imaging and Characterization*. Medical Physics, New York, pp. 409–435.
- Schick, R.S., Loarie, S.R., Colchero, F., Best, B.D., Boustany, A., Conde, D.A., Halpin, P.N., Joppa, L.N., McClellan, C.M., Clark, J.S., 2008. Understanding movement data and movement processes: current and emerging directions. *Ecol. Lett.* 11, 1338–1350.
- Speed, C.W., Meekan, M.G., Field, I.C., McMahan, C.R., Stevens, J.D., McGregor, F., Huveneers, C., Berger, Y., Bradshaw, C.J.A., 2011. Spatial and temporal movement patterns of a multi-species coastal reef shark aggregation. *Mar. Ecol. Prog. Ser.* 429, 261–275.
- Sulak, K.J., Randall, M.T., Edwards, R.E., Summers, T.M., Luke, K.E., Smith, W.T., Norem, A.D., Harden, W.M., Lukens, R.H., Parauka, F., Bolden, S., Lehnert, R., 2009. Defining winter trophic habitat of juvenile Gulf Sturgeon in the Suwannee and Apalachicola rivermouth estuaries, acoustic telemetry investigations. *J. Appl. Ichthyol.* 25, 505–515.
- Welch, D.W., Melnychuk, M.C., Payne, J.C., Rechisky, E.L., Porter, A.D., Jackson, G.D., Ward, B.R., Vincent, S.P., Wood, C.C., Semmens, J., 2011. In situ measurement of coastal ocean movements and survival of juvenile Pacific salmon. *Proc. Nat. Acad. Sci. U. S. A.* 108, 8708–8713.
- Welsh, J.Q., Fox, R.J., Webber, D.M., Bellwood, D.R., 2012. Performance of remote acoustic receivers within a coral reef habitat: implications for array design. *Coral Reefs* 31, 693–702.
- Wilson, C.J., Wilson, P.S., Greene, C.A., Dunton, K.H., 2013. Seagrass meadows provide an acoustic refuge for estuarine fish. *Mar. Ecol. Prog. Ser.* 472, 117–127.

## Broad-scale coastal movements of white sharks off Western Australia described by passive acoustic telemetry data

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**Abstract.** Movements of 89 acoustically tagged subadult and adult white sharks (*Carcharodon carcharias*) were monitored off the south and west coasts of Western Australia (WA) between December 2008 and May 2016 by a network of up to 343 passive acoustic receivers. In all, 290 inter-regional movements, totalling 185 092 km were recorded for 73 of these sharks. Estimated rates of movement in excess of 3 km h<sup>-1</sup> (mean 1.7 km h<sup>-1</sup>; maximum 5.6 km h<sup>-1</sup>) were common, even over distances of thousands of kilometres. Detections indicated that white sharks may be present off most of the south and lower west coasts of WA throughout the year, although they are more likely to be encountered during spring and early summer and are least likely to be present during late summer and autumn. There was limited evidence of predictable return behaviour, seasonal movement patterns or coordination of the direction and timing of individual shark's movements. Nevertheless, the data suggest that further analyses of movements in relation to ecological factors may be useful predictors of shark activity at local scales. It is hoped that these data may be useful for informing public safety initiatives aimed at mitigating the risks associated with human encounters with white sharks off the WA coast.

Received 20 June 2016, accepted 19 January 2017, published online 17 March 2017

### Introduction

White sharks (*Carcharodon carcharias*) have a circumglobal distribution in temperate to tropical latitudes (Compagno 2001; Last and Stevens 2009), where they are most commonly found in temperate continental shelf waters and around oceanic islands, although in some regions they may spend considerable periods in the open ocean (Weng *et al.* 2007; Bruce 2008; Domeier and Nasby-Lucas 2008). The species is most frequently encountered off South Africa (Cliff *et al.* 1996; Kock *et al.* 2013), southern Australia (Bruce *et al.* 2006), New Zealand (Duffy *et al.* 2012), northern California (Boustany *et al.* 2002), Mexico (Domeier *et al.* 2012; Santana-Morales *et al.* 2012) and the north-eastern US (Casey and Pratt 1985; Skomal *et al.* 2012). In regions where *C. carcharias* is relatively common, individuals are widely but not evenly distributed and occur in low abundance, although in some areas they may be more locally abundant around pinniped colonies (Klimley 1985; Bruce 1992; Malcolm *et al.* 2001; Robbins and Booth 2012; Skomal *et al.* 2012; Kock *et al.* 2013; Bruce and Bradford 2015; Francis *et al.* 2015). Satellite-tagged white sharks have repeatedly been shown to travel thousands of kilometres through continental shelf and oceanic waters (Bruce *et al.* 2006; Weng *et al.* 2007; Domeier and Nasby-Lucas 2008; Duffy *et al.* 2012) and trans-oceanic return movements have been documented for the species between South Africa and north-west Australia (Bonfil *et al.* 2005). A common feature of

previous studies has been seasonal or, in some cases, more frequent returns to tagging sites (Boustany *et al.* 2002; Bonfil *et al.* 2005; Domeier and Nasby-Lucas 2008; Weng and Honebrink 2013).

In Australia, white sharks most commonly occur across the southern half of the continent, from central Queensland on the east coast to North-West Cape in Western Australia (WA), but may occasionally occur further north on both coasts (Paterson 1990; Bruce *et al.* 2006; Last and Stevens 2009). Adult and subadult white sharks appear to occur particularly frequently around some fur seal (*Arctocephalus pusillus doriferus* and *Arctocephalus forsteri*) and sea lion (*Neophoca cinerea*) colonies off the south coast of the continent, including the Neptune Islands in South Australia (SA), areas of the Great Australian Bight and the Recherche Archipelago in WA (Malcolm *et al.* 2001). Based on observations of temporal changes in the size and sex of sharks around the Neptune Islands (Robbins 2007; Robbins and Booth 2012; Bruce and Bradford 2015), acoustic telemetry data (Bruce *et al.* 2005a; Bruce and Bradford 2011; Rogers and Huveneers 2016) and satellite tracking (Bruce and Stevens 2004; Bruce *et al.* 2005b), it is apparent that individual sharks do not permanently reside at these locations and actually spend the majority of their time away from them. Satellite tracking has shown that sharks from the Neptune Islands undertake extensive coastal movements to North West Cape in

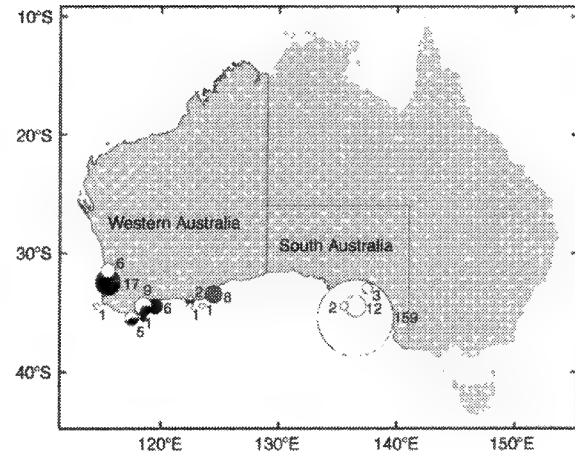


WA and return movements to Rockhampton in Queensland (Bruce *et al.* 2006). Long-distance movements have also been documented between eastern Tasmania and the southern Great Barrier Reef (Bruce and Bradford 2012). However, no individuals have been observed to travel up both the west and east coasts of Australia and genetic evidence suggests that sharks off the eastern and western coasts effectively form two functionally separate populations in Australian waters (Blower *et al.* 2012).

Despite their perceived association with pinniped prey, white sharks are versatile predators that feed on teleosts and other elasmobranchs throughout life (Bruce 1992), adding larger prey items to their diet as subadults (Malcolm *et al.* 2001). White sharks first commonly appear at pinniped colonies in Australia by ~3.0-m total length (TL), which probably indicates the size at which marine mammals are added to their diet. The smallest examined white shark from Australian waters to contain pinniped remains in its stomach was 2.7 m TL (Malcolm *et al.* 2001). These observations are consistent with vertebral isotope analyses that indicate a dietary shift to include marine mammals by ~3.4 m (Estrada *et al.* 2006). Adult, subadult and juvenile white sharks are also frequently observed scavenging on whale carcasses (Carey *et al.* 1985; Curtis *et al.* 2006; Dicken 2008) and may be particularly active around whale stranding sites (Bruce and Stevens 2004). The species has also been recorded to feed on sunfish, tuna, birds, sea otters and turtles (Ames *et al.* 1996; Fergusson *et al.* 2000; Kim *et al.* 2012). Owing to their large size, generally coastal distribution, dietary versatility and variety of predatory behaviours, white sharks can pose a threat to human safety and have been responsible for numerous injurious and fatal encounters with people throughout their range, but especially in Australian waters (West 2011).

Although human encounters with sharks, including white sharks, very rarely result in injuries, shark bites can have traumatic consequences for those involved, their families, friends and affected communities. Furthermore, shark bites often receive disproportionately high levels of media attention and may have flow-on economic effects for tourism and other marine-related industries (Francis 2011; Neff 2012; Neff and Yang 2013). Bites from white sharks can be especially traumatic and, in the 50 years between 1966 and 2015 inclusive, this species has reportedly been responsible for twice as many fatalities in Australia ( $n = 42$ ) than all other shark species combined ( $n = 21$ ; Australian Shark Attack File 2015). In WA waters, 95 injurious and 26 fatal shark attacks were recorded between March 1803 and December 2015 inclusive (Australian Shark Attack File 2015). Although the annual frequency of those incidents has been highly variable, there has been an increasing trend since the 1970s (West 2011; Department of Fisheries, Government of Western Australia, 2012). Notwithstanding underestimation of historical shark bite records due to a lack of organised data collection programs before the late 1980s, approximately half of all recorded shark attacks ( $n = 65$ ) and fatalities ( $n = 12$ ) in waters off the WA coast have occurred during the two decades between 1 January 1996 and 31 December 2015. The last 10 fatalities, all of which involved white sharks, took place over an ~6-year period between August 2010 and June 2016.

In response to the increasing frequency of white shark bites and encounters off the WA coast, several initiatives to monitor



**Fig. 1.** Spatial distribution of acoustic transmitters (tags) deployed on 234 *Carcharodon carcharias* between December 2007 and December 2015. Pie charts illustrate the numbers of sharks tagged externally (white segments), internally (grey segments) and with dual internal and external transmitters (black segments) by 1° latitude and longitude blocks. Numbers indicate the total number of sharks tagged in each block.

potential shark hazards and study the local ecology of white sharks have been introduced. The research reported herein was undertaken to describe when, where and why this species occurs off the most populated parts of the WA coastline, to help understand the complex and dynamic interactions between shark and human abundance, distribution and behaviours that contribute to white shark bites. Specifically, the aims of the study were to investigate: (1) patterns of white shark occurrence and movements off WA's south-west and lower-west coasts; (2) the large-scale movements of sharks between SA and WA waters; and (3) whether individual sharks repeatedly visit or are resident at particular locations off the WA coast. The results from this study of the species' coastal movements may be useful for developing effective, evidence-based strategies for mitigating the risks associated with human encounters with this species in WA and internationally where white shark bites are an issue of concern.

## Materials and methods

### Tagging

In all, 234 *C. carcharias* were tagged with Vemco V16-6H, V16-6L and V16-5L acoustic transmitters (Bedford, NS, Canada) with random transmission intervals of between 50 and 130 s (V16-6H, V16-6L) or between 70 and 150 s (V16-5L). Transmitters were fitted to sharks between 20 December 2007 and 30 December 2015, off SA ( $n = 177$ ) and WA ( $n = 57$ ), during cage diving tourism operations at the Neptune Islands, targeted research activities in both states and opportunistically in WA, usually when sharks were encountered scavenging whale carcasses (Fig. 1). Transmitters were fitted externally to all sharks tagged in SA and to 48 sharks tagged in WA, by 1.6-mm diameter 316-grade stainless steel wire rope tethers attached to sharpened stainless steel anchors. These external tags were embedded in the dorsal musculature using applicator

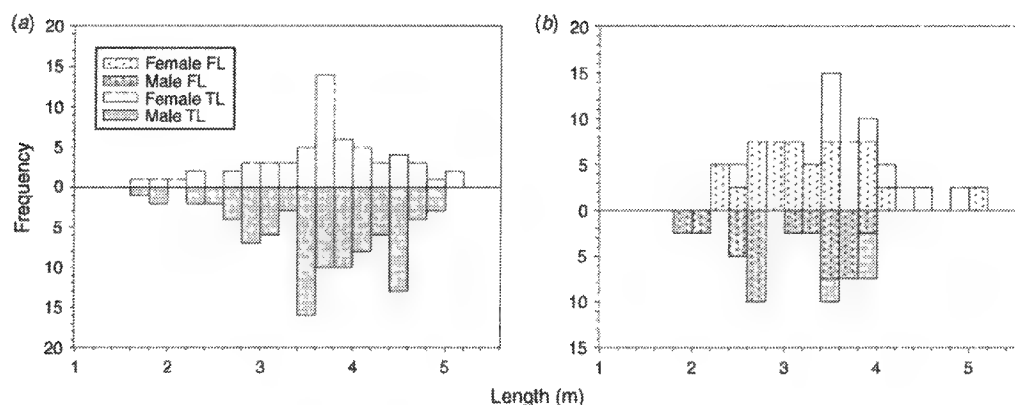


Fig. 2. Size frequencies (number) of *Carcharodon carcharias* tagged in (a) South Australia ( $n = 156$ ) and (b) Western Australia ( $n = 54$ ) showing estimated total length (TL) of externally tagged sharks and measured fork length (FL) of internally tagged sharks. Note, size or sex was not recorded for 24 sharks.

needles mounted on fibreglass hand-spears as the sharks swam past tagging vessels. Between October 2012 and September 2015, 37 sharks were caught off the lower west and south coasts of WA during targeted research fishing with individual baited setlines. Captured sharks (which included 28 of the 48 fitted with external tags in WA) were secured in an inverted position alongside tagging vessels and V16-5L and V16-6L transmitters were surgically implanted in the abdominal cavity according to standard techniques (e.g. Heupel and Hueter 2001). Internally tagged sharks were also tagged with uniquely numbered Jumbo Rototags (Dalton ID Systems, Henley on Thames, UK) in their first dorsal fins for future visual recognition before being revived and released. Two of the dual-acoustically tagged sharks (with both internal and external transmitters) were recaptured and retagged with new internal and external transmitters after 347 and 372 days at liberty. A third shark that had previously been fitted with an external tag at the Neptune Islands was also retagged with new internal and external transmitters when captured off Albany (35.03°S, 117.90°E) after 510 days at liberty. Sharks were sexed and either measured to the nearest centimetre fork length (FL) when captured for internal tagging or total length (TL) was visually estimated to the nearest 10 cm when free-swimming sharks were externally tagged (Fig. 2). Because data were not collected to convert estimated and measured lengths, these length units are reported separately below.

The tagging of sharks was authorised under exemption 2527 to the *Western Australian Fish Resources Management Act 1994* (and previous derivations), a Section 115 exemption (South Australian *Fisheries Management Act 2007*) and permits MR00025-1 and U26255 from the Department of Environment, Water and Natural Resources SA (and previous derivations).

### Monitoring

Tagged sharks were monitored by 13 arrays of up to 334 passive (Vemco VR2W and VR4G) acoustic receivers off the WA coast between North West Cape and Cape Le Grand and in Gulf St Vincent and at the Neptune Islands in SA (Fig. 3a). Receiver arrays were deployed in seven different regions (see Fig. 3b–f):

(1) Ningaloo Reef ( $n = 42$ ), as part of the Integrated Marine Observing System's (IMOS) Animal Tracking Facility (<http://imos.org.au/animaltracking>, accessed 25 July 2016); (2) metropolitan Perth ( $n = 134$ –143), including 53 Ocean Tracking Network (OTN) receivers (<http://oceantrackingnetwork.org>); (3) south-west WA ( $n = 52$ ); (4) Chatham Island ( $n = 44$ ); (5) Albany-Bald Island ( $n = 35$ , plus six temporary receivers at Two Peoples Bay); (6) the Recherche Archipelago ( $n = 5$ –18); and (7) SA ( $n = 3$ ), operated by CSIRO at the Neptune Islands (Bradford *et al.* 2011) and IMOS in the Gulf St Vincent (Huveneers *et al.* 2014). The locations of arrays to the south of Ningaloo Reef were chosen for logistical reasons and to reflect the presumed area of greatest overlap between shark and human population abundance. Because receivers were operated by four different organisations for six separate projects, the numbers, configurations and operational periods of each array varied over the course of the present study (Table 1). Because the occurrence and movements of sharks outside WA are largely beyond the scope of these analyses, only the first and last detections of sharks by SA-located receivers (i.e. start and end points of each inter-state movement) are referred to below.

Data were generally retrieved annually from VR2W receivers (biannually from IMOS Animal Tracking receivers at Ningaloo in some years) and weekly (until 31 May 2016) from satellite-linked VR4G receivers. All detection data reported below were collected before May 31 2016.

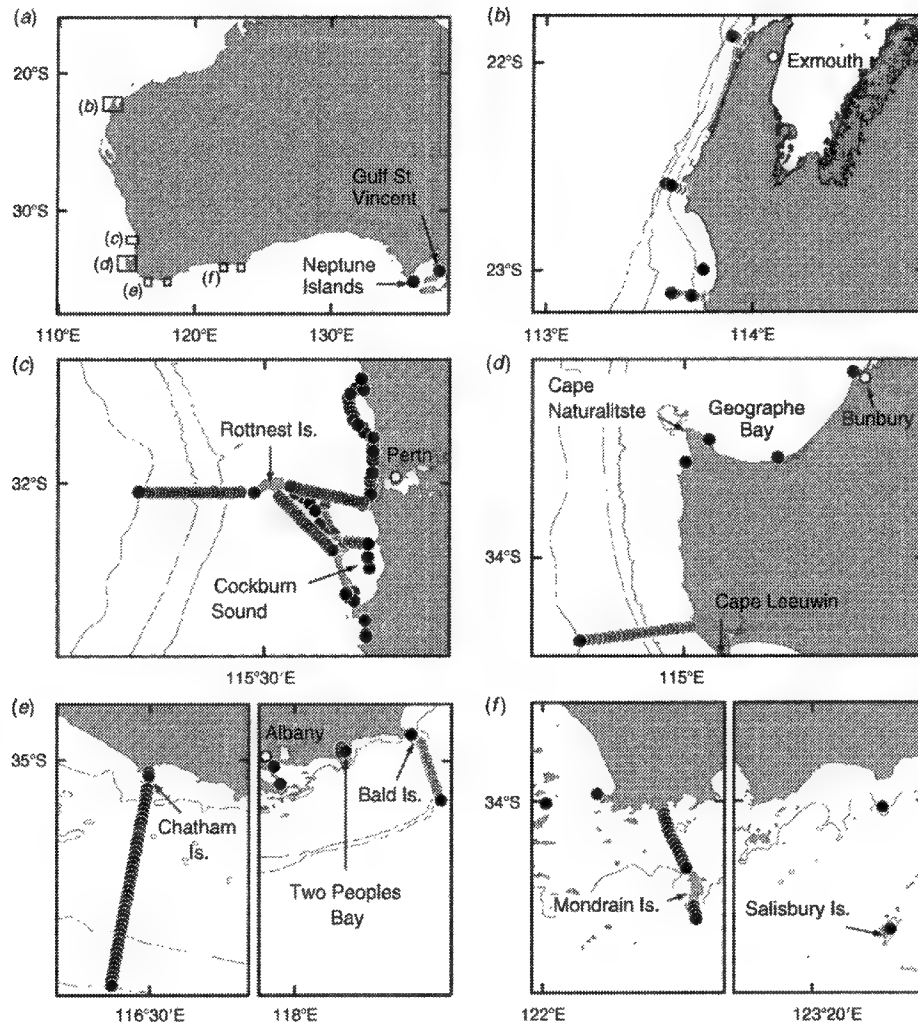
### Movement estimation

The distances of tagged sharks' movements between acoustic receiver arrays and release and recapture locations ( $\Delta\sigma$ ), including the location at which a 3.86-m-FL male shark beached itself, were calculated as least-possible distance vectors between successive points, according to the great circle (or orthodromic) equation:

$$\text{distance} = \arccos[\sin \theta_1 \cdot \sin \theta_2 + \cos \theta_1 \cdot \cos \theta_2 \cdot \cos(\lambda_1 - \lambda_2)] \cdot r$$

where  $\theta_1$ ,  $\lambda_1$  and  $\theta_2$ ,  $\lambda_2$  are the respective latitude and longitude of Receivers 1 and 2, and  $r$  is the radius of the Earth (in radians).





**Fig. 3.** (a) Distribution of acoustic receiver arrays that provided data for the present study and individual receiver locations (closed black circles) in the (b) Integrated Marine Observing System Ningaloo array, (c) combined metropolitan Perth arrays, (d) south-west arrays, (e) Chatham Island (left panel) and Albany, Two Peoples Bay and Bald Island arrays (right panel) arrays and (f) Recherche Archipelago array. Is., island. Locations include all permanent, temporary and relocated receiver stations between December 2008 and May 2016. Isobaths are shown at 50-, 100- and 200-m depths.

To avoid unrealistically estimating movements across land, vectors were forced around arbitrary turning points where necessary. Turning point locations were the same for all sharks and defined as the following points off Dirk Hartog Island (25.5°S 118.0°E), Cape Naturaliste (33.5°S, 115.0°E), Cape Leeuwin (34.4°S, 114.9°E), Black Point (35.0°S, 116.0°E), Albany (35.2°S, 118.0°E) and Cape Arid (34.1°S, 123.3°E).

Because movement vectors assume constant straight line travel between points, they represent the minimum possible distances travelled and, by derivation, associated rates of movement (RoM) are minimum constant speeds over those distances.

Unless indicated otherwise, data are given as the mean  $\pm$  s.d.

## Results

Including release and recapture events, 89 acoustically tagged white sharks were detected a total of 29 171 times between December 2008 and May 2016 within the area monitored by combined WA receiver arrays (Fig. 4). The largest number of sharks ( $n = 52$ ) and most detections ( $n = 21\ 199$ ) were recorded in the Perth metropolitan region, where the largest number of receivers was located over the longest period. The next-largest number of sharks ( $n = 43$ ) was detected over  $\sim 4$  years by the Bald Island array, followed by the arrays at Chatham Island ( $n = 31$  sharks) and Cape Leeuwin ( $n = 24$  sharks), from which 3 years of data were available. Owing to the variable periods of

**Table 1. Characteristics of acoustic receiver arrays located in Western Australia**

All receivers were manufactured by Vemco. IMOS, Integrated Marine Observing System; SMN, Shark Monitoring Network; DoF, Department of Fisheries; OTN, Ocean Tracking Network

Array	Configuration	Receivers	Number of receivers	Data collection period
IMOS Ningaloo	Cross-shelf (partial)	VR2W	42	January 2008–March 2016
SMN Perth	Along-shore and gate	VR2W	19 <sup>A</sup>	January 2009–February 2016
	Location specific	VR4G	19	January 2009–May 2016
DoF snapper	Mixed (gate and cluster)	VR2W	52 <sup>B</sup>	January 2009–February 2016
OTN	Cross-shelf	VR2W	53 <sup>C</sup>	January 2009–February 2016
SMN Albany	Location specific	VR4G	2	October 2013–May 2016
SMN Cape Leeuwin	Cross-shelf	VR2W	48	April 2012–June 2015
SMN Chatham Island	Cross-shelf	VR2W	44	April 2012–June 2015
Two Peoples Bay	Along-shore	VR2W	6	July 2010–November 2010
SMN Bald Island	Cross-shelf	VR2W	33	April 2012–April 2016
SMN Recherche	Cross-shelf (partial)	VR2W	17 <sup>D</sup>	February 2013–April 2016

<sup>A</sup>The array configuration was modified by a reduction to 17 receivers in 2011.

<sup>B</sup>The array configuration was modified by a reduction to 27 receivers in 2015.

<sup>C</sup>The array configuration was modified by an inshore section of the cross-shelf array being moved from mainland-Rottnest Island to mainland-Garden Island–Rottnest Island in February 2014.

<sup>D</sup>The array configuration was modified from 5 spatially-disparate receivers in 2013–2014 to a partial cross-shelf line between November 2014 and April 2016.

operation of the receivers, detection data were standardised by the number of days receivers were in operation. Three receivers in a temporary six-receiver array, deployed between 24 July and 17 November 2011 at the site of a whale carcass stranding in Two Peoples Bay (25 km east of Albany; Fig. 4d), were the most active in the network, with detection rates of 383–732 detections per 100 days of operation. These rates were 3.6- to 6.8-fold higher than the next highest detection rate by a receiver at Salisbury Island, in the Recherche Archipelago (Fig. 4e, right panel) and more than 80 times the mean rate of all other WA-located receivers (mean  $4.5 \pm 8.6$  detections per 100 days of operation).

Excluding the temporary receivers in Two Peoples Bay, the Recherche Archipelago array was the most active in the network, with a mean detection rate of  $18.6 \pm 23.4$  detections per 100 days of operation. The two VR4G receivers in King George Sound off Albany recorded the next highest mean rate of detections per 100 days of operation (8.5), followed by the combined metropolitan arrays ( $6.1 \pm 10.5$ ), the Geographe Bay–Cape Naturaliste VR4G array ( $4.2 \pm 7.1$ ) and the Bald Island ( $3.0 \pm 2.4$ ), Cape Leeuwin ( $2.3 \pm 2.2$ ) and Chatham Island ( $1.7 \pm 1.4$ ) arrays. Not surprisingly, for a species with a primarily temperate distribution, receivers in tropical waters of the IMOS Ningaloo array recorded the lowest mean rate of 0.1 detections per 100 days of operation. However, caution should be used in interpreting detection rates at these regional levels because data were strongly affected by extended detection periods of small numbers of sharks. For example, 146 of the 153 *C. carcharias* detections by the Albany receivers were of a single 5.04-m-FL female shark that was detected on 15 days between 26 March and 30 April 2014. In the Recherche array, two sharks accounted for 81% of detections and in the combined Perth arrays 78% of detections were from just six sharks (9 and 12% of sharks detected in those regions respectively).

Detection data from the cross-shelf arrays off metropolitan Perth, Cape Leeuwin, Chatham Island and Bald Island were characterised by discrete offshore peaks in detection rates by receivers located in 70–120-m depths (Fig. 4b–d). Similarly, higher numbers of individual sharks were detected in offshore waters off the Perth Metropolitan coast, Cape Leeuwin, Chatham Island and Bald Island (Fig. 5). Conversely, although the Recherche array spanned a smaller extent of the continental shelf, detection rates were higher inshore of Mondrain Island than offshore. However, in the most thoroughly monitored region off metropolitan Perth, tagged sharks were most frequently but unevenly detected by receivers within 7 km of the mainland coast. In the southern metropolitan region, sharks were detected in and across the mouth of Cockburn Sound ( $17.0 \pm 18.9$  detections per 100 days of operation) at nearly 10 times the rate of receivers along the northern metropolitan coast ( $1.9 \pm 2.4$  detections per 100 days of operation; Fig. 4b). Although the configuration and numbers of receivers differed between northern and southern metropolitan waters, comparison of detection rates by receivers located similar distances from shore showed similar levels of disparity in detection rates between north and south. In addition, Cockburn Sound receivers detected nearly twice as many different sharks (maximum 12; mean  $6.6 \pm 3.8$ ) than receivers off the northern coast (maximum 7; mean  $3.8 \pm 2.0$ ) and 19 of the 25 sharks tagged in the metropolitan region were also located inside Cockburn Sound or adjacent waters.

Pooled multiyear detection data indicated that *C. carcharias* may be present off the lower west and south coasts of WA throughout the year, although the number of sharks detected and mean detection periods differed seasonally (Fig. 6). Sharks were sporadically detected at Ningaloo Reef in winter (June–August) and late spring (November) to summer (December–January), but too few sharks were detected to suggest these detections may represent a consistent pattern of occurrence in the region.

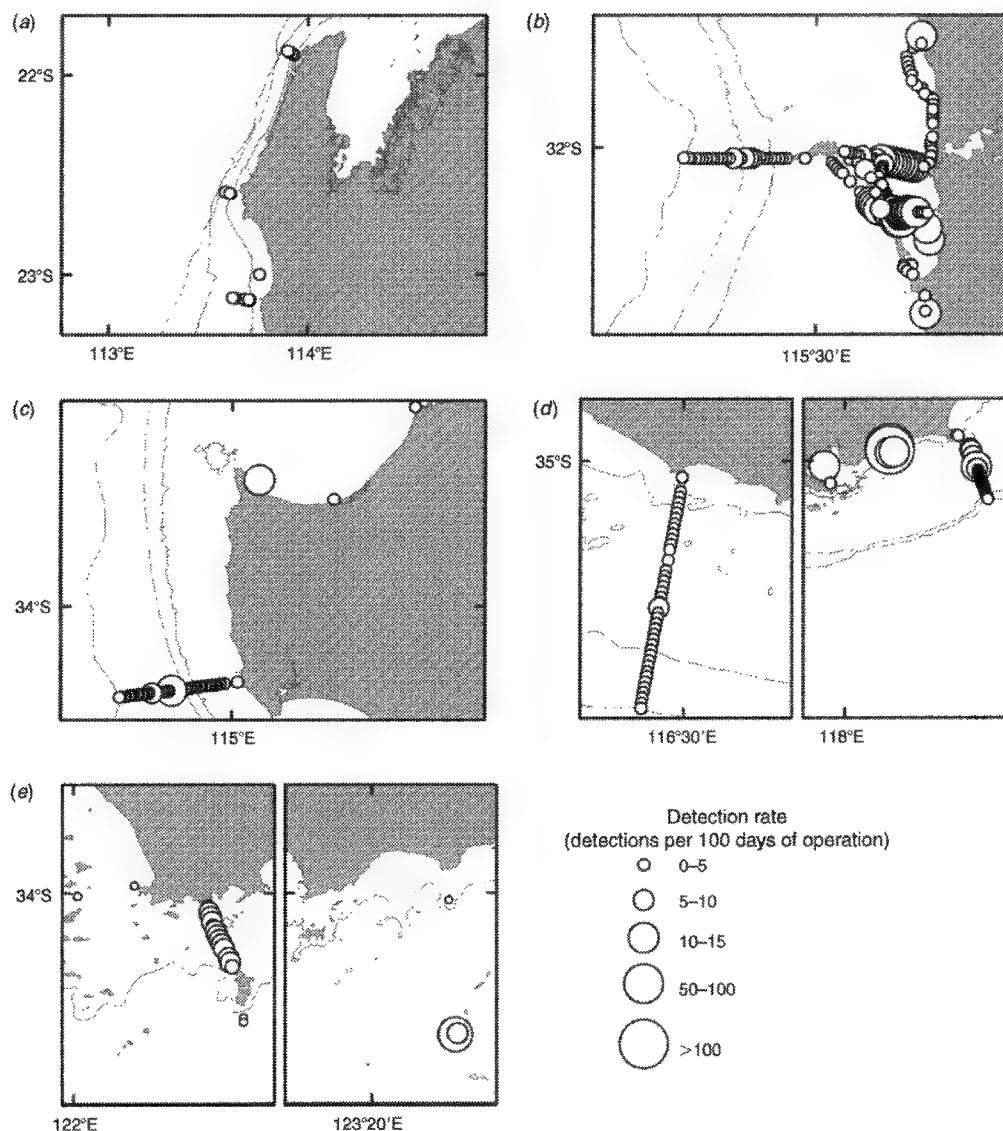


Fig. 4. Detection rates of individual receivers (detections per 100 days of operation) of tagged *Carcharodon carcharias* in the (a) Ningaloo and (b) metropolitan Perth arrays and (c) south-west, (d) Chatham Island, Albany and (e) Recherche Archipelago regions. Isobaths are shown at 50-, 100- and 200-m depths.

Off metropolitan Perth, the numbers of recorded sharks and detection rate increased through winter, before peaking in spring (October). Although relatively high numbers of sharks were also detected off Perth in November and December, the steep decline in detection rates over those months indicated that the amount of time sharks spent within monitored areas in the region was much lower. To the South, the mode of detected shark frequency in Geographe Bay and Cape Leeuwin was December, although the peak in monthly detection rates was slightly earlier in October. The number of sharks detected off the western south coast at Chatham and Bald Islands was slightly more consistent throughout most months, although there were distinct troughs in the

numbers of sharks detected by these arrays between April and July and from February to June respectively. Although pooled monthly detection rates also suggested relatively low levels of shark activity in the Recherche Archipelago between December and February, detections were highly variable and monthly monitoring effort was uneven because of the 18-month data collection period (November 2014–April 2016; Table 1). Thus, seasonal patterns of shark activity remain unclear in this region.

Including data from first and last detections by SA receivers and the known release and recapture locations for the sharks, 293 inter-array and inter-regional movement vectors were estimated for 73 individual sharks. Cumulatively, all estimated

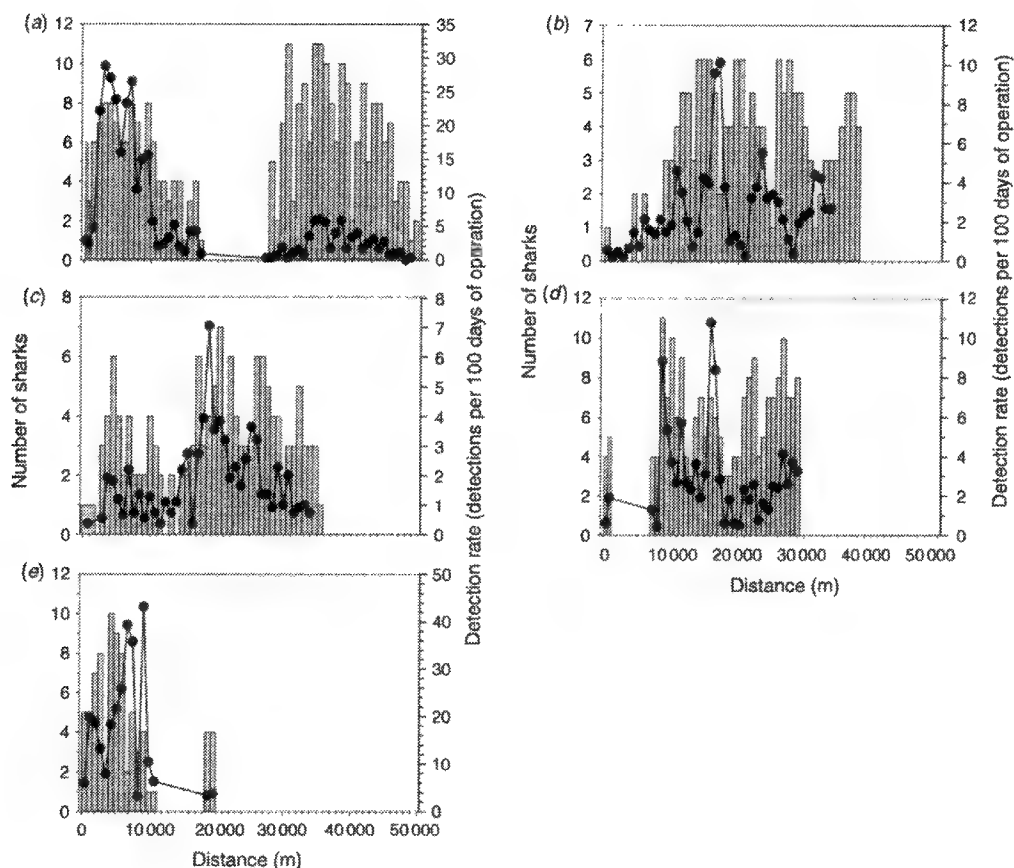


Fig. 5. Frequency of tagged *Carcharodon carcharias* detected (grey bars) and tag detection rates (black lines) by cross-shelf receiver arrays off (a) metropolitan Perth (Ocean Tracking Network), (b) Cape Leeuwin, (c) Chatham Island, (d) Bald Island and (e) Recherche Archipelago.

movement vectors totalled 186 387 km. The maximum individual movement distance (between the Neptune Islands and Ningaloo Reef before arrays were installed off the south and south-west coasts of WA) was estimated to be 3375 km. However, nearly half the estimated individual movements ( $n = 145$ ) were between adjacent receiver arrays or release and recapture locations, over distances of less than 300 km (Fig. 7a). Of the other 148 movements, 67 exceeded 1000 km, 18 were over 2000 km and 6 were over distances of more than 3000 km. Multiple inter-regional movements were recorded for most tagged sharks ( $n = 47$ ) and individuals were recorded travelling cumulative distances of up to 6986 km (mean  $2553 \pm 1733$  km; Fig. 7b). Four sharks tagged in SA made return trips between the Neptune Islands and WA (two to Perth, one to Ningaloo and one made two trips to Cape Leeuwin). Following removal of the CSIRO VR4G at the Neptune Islands, an additional 11 sharks tagged in SA were detected at Ningaloo ( $n = 3$ ), Perth ( $n = 7$ ) and Cape Leeuwin ( $n = 1$ ) before being detected travelling back towards SA by the Bald Island and Recherche arrays. However, because of the lack of consistent receiver coverage in SA and cryptic tag shedding issues, it is

impossible to determine whether those sharks eventually returned to SA. Only one shark tagged in WA was detected (by IMOS receivers in Gulf St Vincent; Fig. 3a) before being recaptured in the Recherche Archipelago.

The maximum RoM was estimated at  $5.6 \text{ km h}^{-1}$  for an  $\sim 1.8\text{-m-TL}$  male shark that travelled between receivers off Bald and Chatham islands (orthodromic distance 193 km) in less than 35 h (Fig. 7c). Twenty-five other sharks were estimated to have maintained RoMs in excess of  $3 \text{ km h}^{-1}$  over distances of between 103 and 3362 km (Fig. 7d), suggesting that rapid, and possibly direct, long-distance movements are relatively common for this species.

There was very limited evidence that white sharks regularly returned to the same WA locations. One of the four sharks that undertook return movements into WA from the Neptune Islands (an  $\sim 5.0\text{-m-TL}$  male) apparently travelled briefly to the south-west corner of WA (between Cape Leeuwin and metropolitan Perth arrays) in August–September 2012 and again in August 2013. In the most intensively monitored region off metropolitan Perth, seven white sharks (five males and two females;  $2.42\text{--}3.92 \text{ m FL}$ ) were redetected in the region more than 1 year

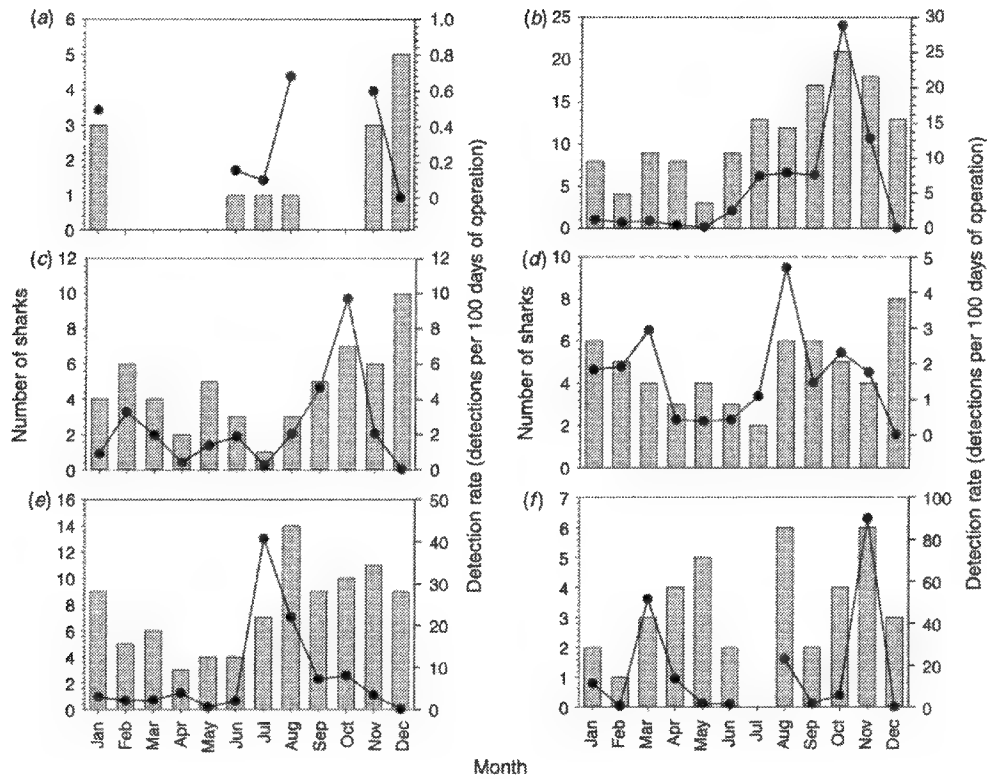


Fig. 6. Monthly detections of tagged *Carcharodon carcharias*. Grey bars indicate the number of sharks detected and the black lines indicate the number of detections by pooled calendar-months in (a) Ningaloo, (b) combined metropolitan, (c) south-west, (d) Chatham Island, (e) Albany and (f) Recherche Archipelago arrays.

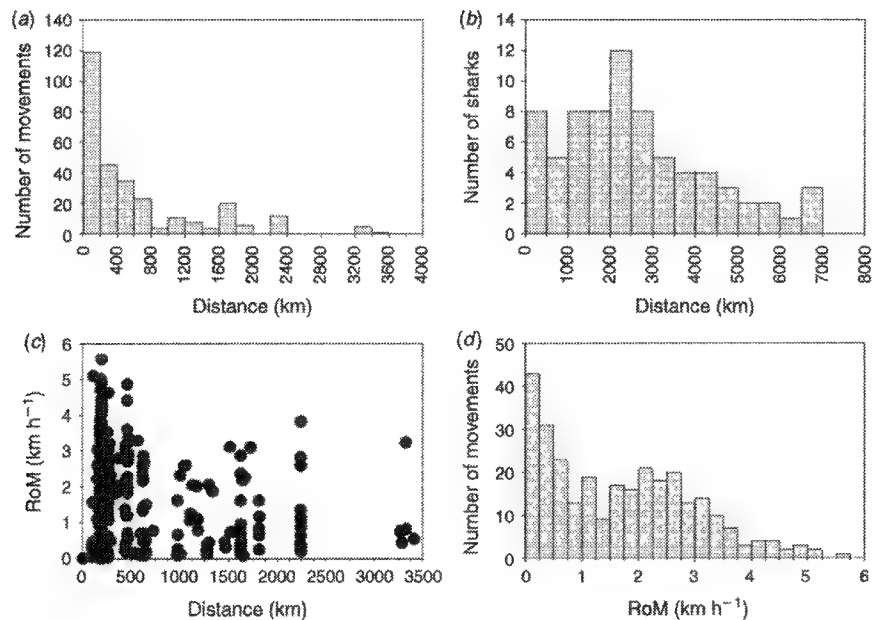


Fig. 7. Frequency distributions of estimated (a) movement distances ( $n = 293$ ) and (b) individual shark's cumulative movement distances ( $n = 73$ ), (c) rate of movement (RoM) plotted against distance and (d) frequency distribution of estimated RoM.

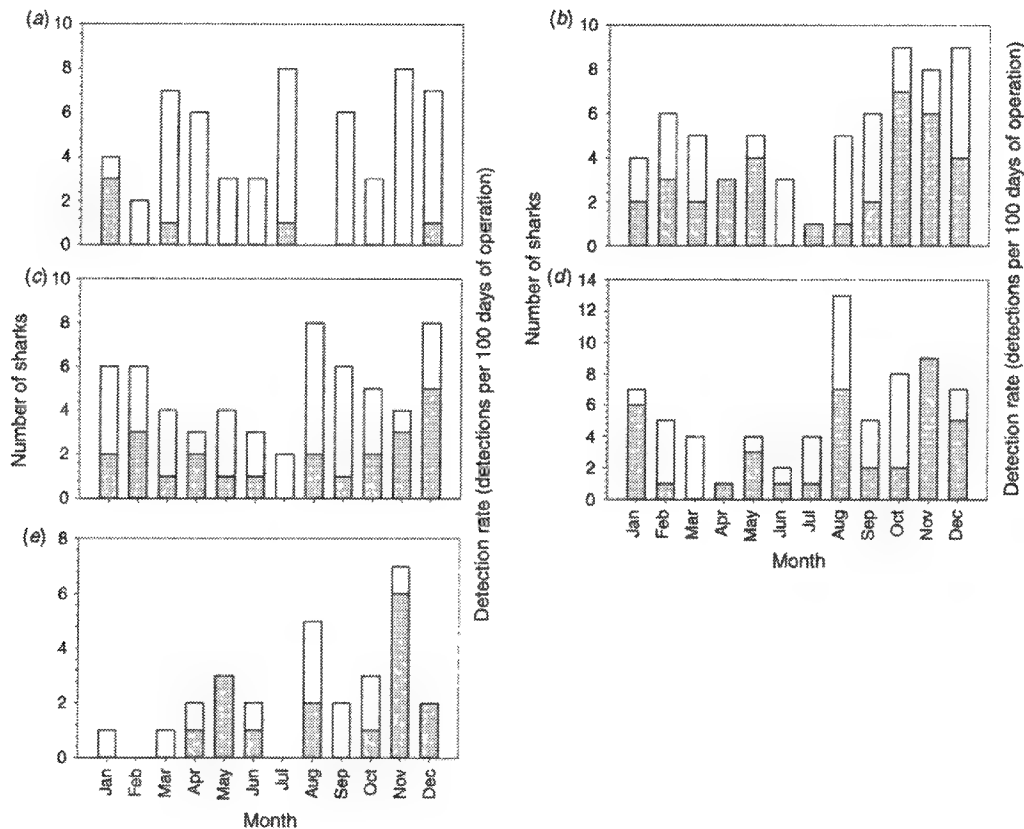


Fig. 8. Pooled monthly movements of *Carcharodon carcharias* into the (a) metropolitan, (b) south-west, (c) Chatham Island, (d) Albany and (e) Recherche Archipelago regions. Grey bars indicate eastward and southward movements and white bars indicate westward and northward movements.

after their first detection (or tagging). Two of these (a 3.86-m-FL female and an ~3.5-m-TL male) were redetected after more than 2 years. Five of the seven sharks were tagged in metropolitan region, one was tagged 30 km east of Albany and one was tagged at the Neptune Islands. All seven of these sharks were detected in the region at least once during spring, but also at other times of the year.

Apart from six sharks detected off Perth as they travelled south after detection at Ningaloo Reef, all the inter-regional movements into the metropolitan arrays were from the south. Movements into the region occurred from the south in all months and from the north in January, March, July and December (Fig. 8a), without any clear seasonal patterns. South of Perth (Fig. 8b-e), shark movements were generally bidirectional in most months and there were no clear indications of seasonal patterns in movement directions. Although the frequency of detected movements between south-west (Cape Leeuwin and Geographe Bay) and south coast (Chatham Island, Bald Island and Recherche Archipelago) arrays increased during winter and spring months, the directionality of those movements were approximately equal. The only suggestion of distinct seasonal travel was from eight of the 11 sharks that travelled to Ningaloo, which were first detected there between November and January.

However, those detections were composed of separate detections of two groups of three sharks that were tagged within a month of each other at the Neptune Islands and off Perth and, subsequently detected within days to weeks of each other at Ningaloo. It is unclear whether these unusually coordinated or coincidental movements are representative of all the sharks that travel as far North as Ningaloo.

## Discussion

Understanding the ecological factors affecting encounters with *C. carcharias* in WA has previously been hampered by the paucity of data describing the species' apparently sporadic occurrence off the extensive Western Australian coastline (Department of Fisheries, Government of Western Australia, unpubl. data). Satellite telemetry data from four sharks (Bruce and Stevens 2004; Bruce *et al.* 2006) and occasional but inconsistent records of white shark captures, sightings and bites (McAuley *et al.* 2016) were of little value in explaining how the probability of human encounters with this species changes with time and location. In lieu of reliable empirical data to explain these rare and unpredictable events, there has been considerable speculation about the reasons for apparent increases in white

shark encounters and bites, and many theories and opinions have instead gained popular acceptance (Department of Fisheries, Government of Western Australia 2012).

Tag detection data collected since 2009 have revealed that white sharks may be encountered off the lower west and south coasts of WA at any time of year. Apart from brief reductions in the abundance of tagged sharks off Cape Leeuwin and Chatham Island in winter, Albany and Bald Island in autumn and the Recherche Archipelago in late summer–early autumn, the data indicate that *C. carcharias* abundance is more seasonally consistent off the south coast of WA than off the lower west coast. As suggested by the number of sharks detected off Perth and concurrent peak in mean duration of detection periods, it appears that the probability of encountering the species off the metropolitan coast is highest between September and December and lowest (but never zero) between February and May. This peak detection period in metropolitan and south-west regions corresponds to a relative increase in the frequency of *C. carcharias* bites to people in spring and early summer, with 43% of incidents having occurred in these regions between October and December (ASAF 2015). However, because the probability of human–shark encounters is confounded with people's participation in aquatic activities, which increases with improving weather and ocean conditions during spring, the disproportionately high rate of shark bite incidents in the region at this time of year cannot be solely attributed to changes in white shark abundance.

Despite the seasonal patterns in their occurrence, the direction and timing of the movements of individual sharks were found to be highly variable throughout the study area. Apart from the specific examples of concurrent movements to Ningaloo Reef and, in some of those cases, back to Perth and south-west WA, *C. carcharias* were recorded travelling past each monitored region in both directions at most times of the year. Such asynchronous movements do not support one popular theory (Sprivulis 2014) that white sharks follow humpback whales (*Megaptera novaeangliae*) as they predictably migrate northwards along the WA coast during winter (June–August) and southwards in spring (August–November; Jenner *et al.* 2001; Kent *et al.* 2012). However, given the extent of the movements of tagged sharks off the WA coast, it is apparent that they co-occur along much of the *M. novaeangliae* migration route. Although *C. carcharias* is not known to actively predate great whales, they have frequently been observed scavenging carcasses (Bruce and Stevens 2004) and 11 of the sharks tagged in WA, including all 9 tagged in 2009–10, were located in vicinity of humpback, southern right (*Eubalaena australis*) and sperm (*Physeter macrocephalus*) whale carcasses. This association was opportunistically investigated when five sharks were monitored at the site of a beached humpback carcass in Two Peoples Bay (25 km east of Albany) between June and September 2010. Detections by a temporary six-receiver array deployed in the area revealed that tagged sharks continued to visit the bay for up to  $17 \pm 7$  days after the carcass had come ashore. However, their visits were typically brief (mean detection period  $7 \text{ h day}^{-1}$ ) and declined in frequency and duration, presumably as the sharks' interest diminished after repeated unsuccessful scavenging attempts or scent from the carcass dissipated.

Another popular theory for explaining the increasing rate of *C. carcharias* bites in WA is that sharks have been attracted to the increasing number and densities of long-nosed fur seal (*A. forsteri*) colonies off the south and lower west coasts of WA (Campbell *et al.* 2014). Although receiver arrays were not designed to monitor shark behaviour around pinniped colonies, detection rates from receivers in close proximity to WA seal colony and haul-out sites, were noticeably lower than those of receivers further offshore of those locations. Because nearshore patrolling is a consistent feature of the predatory behaviour of white sharks at pinniped colonies in SA and California (Strong *et al.* 1992; Goldman and Anderson 1999; Bruce *et al.* 2005a; Domeier *et al.* 2012), higher detection rates close to WA colonies would logically be expected if sharks were actively targeting seals at those locations. However, detection rates of white sharks by receivers within 2 km of a large new *A. forsteri* colony at Chatham Island were between 0.00 and 1.35 detections per 100 days of operation compared with an average rate of  $11.41 \pm 16.42$  detections per 100 days of operation by receivers further off Chatham Island. Similarly, detection rates by Ocean Tracking Network (OTN) receivers within 2 km of the west end of Rottnest Island, where an expanding fur seal colony has been blamed for perceived increases in shark activity in the metropolitan area and a fatal bite near the colony in October 2011, were also an order of magnitude lower (0.00–0.27 detections per 100 days of operation) than the average detection rate of OTN receivers further offshore ( $2.33 \pm 1.88$  detections per 100 days of operation).

Given the asynchrony observed in shark movements throughout the study region, the two instances of coordinated or coincidental movements to north-western WA were unusual and the ecological or social drivers for them, if any, remain uncertain. When reporting a tagged 380-cm-TL female's return migration between South Africa and North West Cape, Bonfil *et al.* (2005) suggested that this region may be an area of interbreeding between geographically separated African and Australian populations. However, because all the white sharks detected at Ningaloo during the present study were juveniles and subadults ( $\sim 2.0$ – $3.5 \text{ m TL}$ ), reproductive migration is an unlikely reason for these sharks to visit the region. Because there are multiple, relatively abundant sources of prey between Ningaloo Reef and the Neptune Islands, where most ( $n = 8$ ) of these sharks were tagged, prey availability also does not seem to be a likely explanation. Therefore, as yet undescribed features of *C. carcharias* foraging behaviour provide the most likely explanation for these movements.

The lack of receivers between metropolitan Perth and Ningaloo Reef, and between monitored sites in SA and off Esperance, resulted in obvious gaps in the data recorded from large portions of the ranges of tagged sharks. Although shark movements and behaviour may have differed in those areas from the patterns observed in the more intensively monitored region between Perth and Albany, the primary focus of the present study was to investigate movements along the most heavily populated part of the WA coastline. With the exception of Geraldton on the mid-West coast ( $28.79^\circ\text{S}$ ,  $114.60^\circ\text{E}$ ; population  $\sim 40\,000$ ), monitoring arrays were situated close to all the major coastal population centres around the known Western Australian distribution of white sharks (Last and Stevens 2009).



Thus, these data gaps are not thought to have compromised our interpretation of shark movements in the most heavily populated part of WA or at a broader scale and how these dynamics may relate to the risk of shark bites.

Movements of sharks tagged in SA into WA waters ( $n = 46$ ) were relatively common and their visits were sometimes prolonged. In contrast, only two sharks tagged in WA were detected in SA: a 2.7-m-FL female shark that was detected by IMOS receivers in Gulf St Vincent in February–March 2014 and an as yet unidentified shark that was photographed at the Neptune Islands in June 2015. Despite the small number of acoustic receivers installed at the Neptune Islands, these have been in nearly continuous operation around the Islands since 2008 (Bradford *et al.* 2011; Rogers *et al.* 2014). Given that identical external tagging methods were used in SA and WA and that an increasing number of sharks has been tagged with internal transmitters in WA since 2012, avoiding uncertainties caused by uncertain rates of external tag shedding, the paucity of detections at the Neptune Islands suggests that sharks tagged in WA may not be frequent visitors to this specific location. Although there are several other possible explanations for the lack of detections of sharks tagged in WA in SA (e.g. low levels of receiver coverage, tag shedding, cryptic mortality), previous studies have noted fine-scale spatial sexual and ontogenetic segregation of sharks over relatively small geographic areas (Anderson and Pyle 2003; Robbins and Booth 2012; Kock *et al.* 2013). Therefore, it may be that movements of sharks tagged in WA into SA waters were more common than indicated by detections by Neptune Islands and IMOS Gulf St Vincent receivers.

In WA, detections by cross-shelf receiver arrays were characterised by short detection periods, punctuated by relatively rapid movements between adjacent arrays, suggesting that sharks generally only occurred within and between monitored areas for brief periods. However, data from the more thoroughly monitored metropolitan region included examples of more prolonged localised detection periods, with 10 of the 52 sharks recorded in the region detected in  $\geq 3$  consecutive months, five of them twice. Of the 15 extended metropolitan detection periods of these sharks, 11 included detections in either October or November, implying that ecologically favourable local conditions may have existed during those months. Although four of these sharks were disproportionately responsible for the majority (94%) of detections by receivers in and around Cockburn Sound, where the highest regional detection rates were recorded, extended occurrences of seven other sharks in southern metropolitan waters suggest that the area is particularly attractive to *C. carcharias* at that time of year. In addition to the high detection rates recorded by receivers in southern Perth waters, relatively large numbers of different sharks were detected in the southern part of the region. For example, on average nearly twice as many sharks (range 9–12, mean 10 per receiver) were detected by receivers around north-eastern Cockburn Sound than at beachside locations (range 2–7, mean 4.2 per receiver).

The high abundance and persistence of tagged sharks in southern metropolitan waters during spring and early summer coincided with the seasonal formation of locally significant spawning aggregations of snapper (*Chrysophrys auratus*) in Cockburn Sound and nearly half ( $n = 9$ ) of the 21 *C. carcharias*

tagged in the metropolitan region were caught in close proximity to these aggregations. Extensive commercial and recreational fishery management actions have been introduced over the past decade to rebuild previously overexploited demersal teleost stocks in the metropolitan region and recent assessments now indicate that these stocks are recovering (Fairclough *et al.* 2014). Snapper are thought to be a relatively important component of the diet of white sharks across southern Australia and tagged sharks have previously been associated with prespawning and spawning schools of *C. auratus* in various areas, including Spencer Gulf (SA) and off eastern Victoria (Bruce *et al.* 2006; Sims *et al.* 2012). Thus, the regular seasonal occurrence of spawning aggregations of demersal teleost species off the metropolitan coast provides at least a circumstantial explanation for the observed increase in the seasonal abundance of tagged white sharks and their prolonged detection periods at this time of year.

However, observed occurrences of *C. carcharias* off the metropolitan coast were not restricted to those predictable seasonal prey availability events. For example, four male and female sharks (estimated 3.0–4.5 m TL) were tagged while scavenging whale carcasses in May and July 2009. Another three males and three females (2.1–3.9 m FL) were caught around a highly unseasonal school of Australian salmon (*Arripis truttaceus*) 8 km north of Cockburn Sound during 3 (non-consecutive) days in August 2015. Even sharks that were tagged around *C. auratus* schools in Cockburn Sound were detected away from Cockburn Sound for periods of more than several days. For example, during their extended periods of detection in Cockburn Sound during October and November 2012, two female sharks (2.6 and 3.0 m FL) were concurrently detected over consecutive 3- to 5-day periods by receivers in the central and northern most extents of the metropolitan arrays respectively. Real-time investigations of local ecological conditions during those detection periods revealed large schools of unidentified baitfish and, in the latter case, skipjack tuna (*Katsuwonus pelamis*), Australian sea lions (*N. cinerea*), bottlenose dolphins (*Tursiops aduncus*) and various seabirds were also present. Once these transient conditions subsided, one of the sharks returned to Cockburn Sound for 1 month before departing to Ningaloo Reef, where the other shark was also next detected.

Although accurately predicting when and where individual white sharks may occur off any particular part of the WA coast remains an unrealistic aspiration at this time, the data collected during these ambitious continental-scale international collaborative projects have rapidly and substantially improved our understanding of the movement ecology of white sharks in south-western Australian waters. Although the data suggest that the abundance, distribution and movements of white sharks vary between southern Australian government jurisdictions from one year to another, they have identified periods and locations where white sharks are more likely to occur and have started to identify the range of ecological factors that may influence the probability of encountering this species off the WA coast. More detailed analyses of these data in relation to specific local environmental variables (e.g. ocean temperatures, circulation patterns, Southern Oscillation Indices) may provide additional explanations of the patterns observed in the present study.



Notwithstanding further analyses, the observed patterns of occurrence and movements of tagged sharks provide useful insights into how *C. carcharias* abundance and movements affect probabilities of human encounters with the species. In particular, these results indicate that although white shark movements appear asynchronous and uncoordinated, peak activity periods differed along the WA coast. It is hoped that results from the present study may offer an important empirical basis for developing effective and defensible methods for identifying and responding to locally important white shark hazards (e.g. seasonal and transient fish schools and whale carcasses). As such, the authors hope that the results of this study may provide a useful basis for reducing risks of human encounters with white sharks in WA and other regions where such interactions are an issue of concern.

### Acknowledgements

This project was primarily funded through a series of grants from the Western Australian State Government. The authors are indebted to Charlie Huvencers, Paul Rogers and Andrew Fox for data sharing and field assistance and to the following people for their considerable assistance: Russ Bradford, Chris Dowling, Dani Waltrick de Souza, Mark Kleeman, Mark Davidson, Lisa West, Carly Bruce, Rick Allison, Gabby Mitsopoulos, Craig Skepper, Brett Crisafulli, Rod O'Halloran, skippers and crews of the RV *Naturaliste*, PVs *Hamelin*, *Houtman* and *Walcott*, Mike Simmons (Simtron, Melbourne, Vic. Australia), David Whillas (Seabotix, Fremantle, WA. Australia), Nick Stampone (Transfield Services, Fremantle, WA.) and Dave Wilson (Fendercare, Fremantle, WA. Australia). The authors thank the Canada Foundation for Innovation-supported Ocean Tracking Network (OTN) project and the Integrated Marine Observing System (IMOS), which is supported by the Australian Government through the National Collaborative Research Infrastructure Strategy and the Super Science Initiative, for additional acoustic tag detection data. Barry Bruce's time on this project was supported by the Marine Biodiversity Hub, a collaborative partnership supported through funding from the Australian Government's National Environmental Science Programme (NESP). NESP Marine Biodiversity Hub partners include the Institute for Marine and Antarctic Studies at the University of Tasmania, CSIRO, Geoscience Australia, Australian Institute of Marine Science, Museum Victoria, Charles Darwin University, University of Western Australia, NSW Office of Environment and Heritage, NSW Department of Primary Industries and IMOS. The authors are also grateful to Malcolm Francis and the two anonymous reviewers for their comments, which greatly improved this manuscript.

### References

- Ames, J. A., Geibel, J. J., Wendell, F. E., and Pattison, C. A. (1996). White shark-inflicted wounds on sea otters in California, 1968–1992. In 'Great White Sharks: The Biology of *Carcharodon carcharias*'. (Eds A. P. Klimley and D. G. Ainley.) pp. 309–316. (Academic Press: San Diego, CA, USA.)
- Anderson, S. D., and Pyle, P. (2003). A temporal, sex specific occurrence pattern among white sharks at the South Farallon Islands, California. *California Fish and Game* **89**, 96–101.
- Australian Shark Attack File (2015). Australian shark attack file annual report. Annual report summary for 2015. (Taronga Conservation Society Australia, Sydney, NSW, Australia.) Available at <https://taronga.org.au/conservation/conservation-science-research/australian-shark-attack-file/2015> [Verified 17 February 2017].
- Blower, D. C., Pandolfi, J. M., Bruce, B. D., Gomez-Cabrera, M. D., and Ovenden, J. R. (2012). Population genetics of Australian white sharks reveals fine-scale spatial structure, transoceanic dispersal events and low effective population sizes. *Marine Ecology Progress Series* **455**, 229–244. doi:10.3354/MEPS09659
- Bonfil, R. M., Meyer, M., Scholl, M. C., Johnson, R., O'Brien, S., Oosthuizen, H., Swanson, S., Kotze, D., and Paterson, M. (2005). Transoceanic migration, spatial dynamics, and population linkages of white sharks. *Science* **310**, 100–103. doi:10.1126/SCIENCE.1114898
- Boustany, A. M., Davis, S. F., Pyle, P., Anderson, S. D., Le Boeuf, B. J., and Block, B. A. (2002). Expanded niche for white sharks. *Nature* **415**, 35–36. doi:10.1038/415035B
- Bradford, R. W., Bruce, B. D., McAuley, R. B., and Robinson, G. (2011). An evaluation of passive acoustic monitoring using satellite communication technology for near real-time detection of tagged animals in a marine setting. *The Open Fish Science Journal* **4**, 10–20. doi:10.2174/1874401X01104010010
- Bruce, B. D. (1992). Preliminary observations on the biology of the white shark, *Carcharodon carcharias*, in South Australian waters. *Australian Journal of Marine and Freshwater Research* **43**, 1–11. doi:10.1071/MF9920001
- Bruce, B. D. (2008). White sharks: the biology and ecology of *Carcharodon carcharias*. In 'Sharks of the Open Ocean'. (Eds E. Pikitch and M. Camhi.) pp. 69–81. (Blackwell Publishing: Oxford, UK.)
- Bruce, B. D., and Bradford, R. W. (2011). The effects of berleying on the distribution and behaviour of white sharks, *Carcharodon carcharias*, at the Neptune Islands, South Australia. Final report to the Department of Environment and Natural Resources, South Australia. CSIRO, Hobart, Tas., Australia.
- Bruce, B. D., and Bradford, R. W. (2012). Habitat use and spatial dynamics of juvenile white sharks, *Carcharodon carcharias*. In 'Global Perspectives on the Biology and Life History of the White Shark'. (Ed. M. Domeier.) pp. 225–253. (CRC Press: Boca Raton, FL, USA.)
- Bruce, B. D., and Bradford, R. W. (2015). Segregation or aggregation? Sex-specific patterns in the seasonal occurrence of white sharks at the Neptune Islands, South Australia. *Journal of Fish Biology* **87**, 1355–1370. doi:10.1111/JFB.12827
- Bruce, B., and Stevens, J. (2004). Tracking the movement patterns of large white sharks in Australian waters. Final report to AQWA, the Aquarium of Western Australia and the AQWA Research Foundation, CSIRO Marine Research, Hobart, Tas., Australia.
- Bruce, B. D., Stevens, J. D., and Bradford, R. W. (2005a). Identifying movements and habitats of white sharks and grey nurse sharks. Final report to Department of Environment and Heritage, CSIRO, Hobart, Tas., Australia.
- Bruce, B. D., Stevens, J. D., and Bradford, R. W. (2005b). Site fidelity, residence times and home range patterns of white sharks around pinniped colonies. Final report to Department of Environment and Heritage, CSIRO, Hobart, Tas., Australia.
- Bruce, B. J., Stevens, J. D., and Malcolm, H. (2006). Movements and swimming behaviour of white sharks (*Carcharodon carcharias*) in Australian waters. *Marine Biology* **150**, 161–172. doi:10.1007/S00227-006-0325-1
- Campbell, R., Holley, D. A., Collins, P., and Armstrong, S. (2014). Changes in the abundance and distribution of the New Zealand fur seal (*Arctocephalus forsteri*) in Western Australia: are they approaching carrying capacity? *Australian Journal of Zoology* **62**, 261–267. doi:10.1071/ZO14016
- Carey, F. G., Casey, J. G., Pratt, H. L., Jr, Urquhart, D., and McCosker, J. E. (1985). Temperature, heat production and heat exchange in lamnid sharks. *Memoirs of the Southern California Academy of Sciences* **9**, 92–108.
- Casey, J. G., and Pratt, H. L., Jr (1985). Distribution of the white shark, *Carcharodon carcharias*, in the western North Atlantic. *Memoirs of the Southern California Academy of Sciences* **9**, 2–14.
- Cliff, G., Dudley, S. F. J., and Fry, M. R. (1996). Catches of white sharks in KwaZulu-Natal, South Africa and environmental influences. In 'Great White Sharks: The Biology of *Carcharodon carcharias*'. (Eds A. P. Klimley and D. G. Ainley.) pp. 351–362. (Academic Press: San Diego, CA, USA.)

- Compagno, L. J. V. (2001). 'Sharks of the World. An Annotated and Illustrated Guide of the shark species known to date. Volume 2. Bullhead, mackerel and carpet sharks (Heterodontiformes, Lamniformes and Orectolobiformes).' FAO Species Catalogue for Fishery Purposes. (Food and Agriculture Organization of the United Nations: Rome, Italy.)
- Curtis, T., Kelly, J. T., Menard, K. L., Laroche, R. K., Jones, R. E., and Klimley, A. P. (2006). Observations on the behaviour of white sharks scavenging from a whale carcass at Point Reyes, California. *California Fish and Game* 92, 113–124.
- Department of Fisheries, Government of Western Australia (2012). A correlation study of the potential risk factors associated with white shark attacks in Western Australian waters November 2012. Fisheries Occasional Publication number 109, Department of Fisheries, Perth, WA, Australia.
- Dicken, M. L. (2008). First observations of young of the year and juvenile great white sharks (*Carcharodon carcharias*) scavenging from a whale carcass. *Marine and Freshwater Research* 59, 596–602. doi:10.1071/MF07223
- Domeier, M. L., and Nasby-Lucas, N. (2008). Migration patterns of white sharks *Carcharodon carcharias* tagged at Guadalupe Island, Mexico, and identification of an eastern Pacific shared offshore foraging area. *Marine Ecology Progress Series* 370, 221–237. doi:10.3354/MEPS07628
- Domeier, M. L., Nasby-Lucas, N., and Lam, C. H. (2012). Fine-scale habitat use by white sharks at Guadalupe Island, Mexico. In 'Global Perspectives on the Biology and Life History of the White Shark'. (Ed. M. Domeier.) pp. 121–132. (CRC Press: Boca Raton, FL, USA.)
- Duffy, C., Francis, M., Manning, M., and Bonfil, R. (2012). Regional population connectivity, oceanic habitat, and return migration revealed by satellite tagging of white sharks, *Carcharodon carcharias*, at New Zealand aggregation sites. In 'Global Perspectives on the Biology and Life History of the White Shark'. (Ed. M. Domeier.) pp. 301–318. (CRC Press: Boca Raton, FL, USA.)
- Estrada, J. A., Rice, A. N., Natanson, L. J., and Skomal, G. B. (2006). Use of isotopic analysis of vertebrae in reconstructing ontogenetic feeding ecology in white sharks. *Ecology* 87, 829–834. doi:10.1890/0012-9658(2006)87[829:UOIAOV]2.0.CO;2
- Fairclough, D. V., Molony, B. W., Crisafulli, B. M., Keay, I. S., Hesp, S. A., and Marriott, R. J. (2014). Status of demersal finfish stocks on the west coast of Australia. Fisheries Research Report number 253, Department of Fisheries, Perth, WA, Australia.
- Fergusson, I. K., Compagno, L. J. V., and Marks, M. A. (2000). Predation by white sharks *Carcharodon carcharias* (Chondrichthyes: Lamnidae) upon chelonians, with new records from the Mediterranean Sea and a first record of the ocean sunfish *Mola mola* (Osteichthyes: Molidae) as stomach contents. *Environmental Biology of Fishes* 58, 447–453. doi:10.1023/A:1007639324360
- Francis, B. (2011). Before and after *Jaws*: changing representations of shark attacks. B.A.(History)(Hons) thesis, Murdoch University, WA, Australia.
- Francis, M. P., Duffy, C., and Lyon, W. (2015). Spatial and temporal habitat use by white sharks (*Carcharodon carcharias*) at an aggregation site in southern New Zealand. *Marine and Freshwater Research* 66, 900–918. doi:10.1071/MF14186
- Goldman, K. J., and Anderson, S. D. (1999). Space utilization and swimming depth of white sharks, *Carcharodon carcharias*, at the South Farallon Islands, central California. *Environmental Biology of Fishes* 56, 351–364. doi:10.1023/A:1007520931105
- Heupel, M. R., and Hueter, R. E. (2001). Use of a remote acoustic telemetry system to monitor shark movements in a coastal nursery area. In 'Electronic Tagging and Tracking in Marine Fisheries'. (Eds J. R. Sibert and J. L. Nielsen.) pp. 217–236. (Kluwer Academic Publishers: Dordrecht, Netherlands.)
- Huveneers, C., Rogers, P. J., and Drew, M. (2014). Monitoring shark species of conservation concern within the Adelaide metropolitan and Gulf St Vincent regions. Final Report to the Adelaide & Mount Lofty Ranges Natural Resources Management Board, SARDI Publication number F2013/000716-1, SARDI Research Report Series number 754, South Australian Research and Development Institute (Aquatic Sciences), Adelaide, SA, Australia.
- Jenner, K. C. S., Jenner, M.-N. M., and McCabe, K. A. (2001). Geographical and temporal movements of humpback whales in Western Australian waters. *APPEA Journal* 2001, 749–765.
- Kent, C. S., Jenner, C., Jenner, M., Bouchet, P., and Rexstad, E. (2012). Southern hemisphere breeding stock D humpback whale population estimates from North West Cape, Western Australia. *The Journal of Cetacean Research and Management* 12, 29–38.
- Kim, S. L., Tinker, M. T., Estes, J. A., and Koch, P. L. (2012). Ontogenetic and among-individual variation in foraging strategies of northeast Pacific white sharks based on stable isotope analysis. *PLoS One* 7(9), e45068. doi:10.1371/JOURNAL.PONE.0045068
- Klimley, A. P. (1985). The areal distribution and autoecology of the white shark, *Carcharodon carcharias*, off the west coast of North America. *Memoirs of the Southern California Academy of Sciences* 9, 15–40.
- Kock, A., O'Riain, M. J., Mauff, K., Meyer, M., Kotze, D., and Griffiths, C. (2013). Residency, habitat use and sexual segregation of white sharks, *Carcharodon carcharias* in False Bay, South Africa. *PLoS One* 8(1), e55048. doi:10.1371/JOURNAL.PONE.0055048
- Last, P. R., and Stevens, J. D. (2009). 'Sharks and Rays of Australia'. 2nd edn. (CSIRO Publishing: Melbourne, Vic., Australia.)
- Malcolm, H., Bruce, B. D., and Stevens, J. D. (2001). 'A Review of the Biology and Status of White Sharks in Australian Waters. (CSIRO Marine Research: Hobart, Tas., Australia.)
- McAuley, R., Bruce, B., Keay, I., Mountford, S., and Pinnell, T. (2016). Evaluation of passive acoustic telemetry approaches for monitoring and mitigating shark hazards off the coast of Western Australia, Western Australia. Fisheries Research Report number 273, Department of Fisheries, Perth, WA, Australia.
- Neff, C. (2012). Australian beach safety and the politics of shark attacks. *Coastal Management* 40, 88–106. doi:10.1080/08920753.2011.639867
- Neff, C. L., and Yang, J. Y. H. (2013). Shark bites and public attitudes: policy implications from the first before and after shark bite survey. *Marine Policy* 38, 545–547. doi:10.1016/J.MARPOL.2012.06.017
- Paterson, R. A. (1990). Effects of long-term anti-shark measures on target and non-target species in Queensland, Australia. *Biological Conservation* 52, 147–159. doi:10.1016/0006-3207(90)90123-7
- Robbins, R. L. (2007). Environmental variables affecting the sexual segregation of great white sharks *Carcharodon carcharias* at the Neptune Islands South Australia. *Journal of Fish Biology* 70, 1350–1364. doi:10.1111/J.1095-8649.2007.01414.X
- Robbins, R., and Booth, D. (2012). Seasonal, sexual and size segregation of white sharks, *Carcharodon carcharias*, at the Neptune Islands, South Australia. In 'Global Perspectives on the Biology and Life History of the White Shark'. (Ed. M. Domeier.) pp. 287–299. (CRC Press: Boca Raton, FL, USA.)
- Rogers, P. J., and Huveneers, C. (2016). Residency and photographic identification of white sharks *Carcharodon carcharias* in the Neptune Islands Group Marine Park between 2013 and 2015. Report to the Department of Environment, Water and Natural Resources, SARDI Publication number F2015/000825-1, SARDI Research Report Series number 893, South Australian Research and Development Institute (Aquatic Sciences), Adelaide, SA, Australia.
- Rogers, P. J., Huveneers, C., and Beckmann, C. (2014). Monitoring residency of white sharks, *Carcharodon carcharias* in relation to the cage-diving industry in the Neptune Islands Group Marine Park. SARDI Publication number F2014/000800-1, SARDI Research Report Series number 818, South Australian Research and Development Institute (Aquatic Sciences), Adelaide, SA, Australia.

- Santana-Morales, O., Sosa-Nishizaki, O., Escobedo-Olvera, M., Onate-Gonzalez, E., O'Sullivan, J., and Cartamil, D. (2012). Incidental catch and ecological observations of juvenile white sharks, *Carcharodon carcharias*, in western Baja California, Mexico. Conservation implications. In 'Global Perspectives on the Biology and Life History of the White Shark'. (Ed. M. Domeier.) pp. 187–198. (CRC Press: Boca Raton, FL, USA.)
- Sims, D. W., Humphries, N. E., Bradford, R. W., and Bruce, B. D. (2012). Levy flight and Brownian search patterns of white sharks in response to different prey fields. *Journal of Animal Ecology* **81**, 432–442. doi:10.1111/j.1365-2656.2011.01914.X
- Skomal, G. B., Chisholm, J., and Correai, S. (2012). Implications of increasing pinniped populations on the diet and abundance of white sharks off the coast of Massachusetts. In 'Global Perspectives on the Biology and Life History of the White Shark'. (Ed. M. Domeier.) pp. 405–418. (CRC Press: Boca Raton, FL, USA.)
- Sprivulis, P. C. (2014). Western Australia coastal shark bites: a risk assessment. *The Australasian Medical Journal* **7**, 137–142. doi:10.4066/AMJ.2014.2008
- Strong, W. R., Jr, Murphy, R. C., Bruce, B. D., and Nelson, D. R. (1992). Movements and associated observations of bait-attracted white sharks, *Carcharodon carcharias*: a preliminary report. *Marine and Freshwater Research* **43**, 13–20. doi:10.1071/MF9920013
- Weng, K., and Honebrink, R. (2013). Occurrence of white sharks (*Carcharodon carcharias*) in Hawaiian waters. *Journal of Marine Biology* **2013**, 598745. doi:10.1155/2013/598745
- Weng, K. C., Boustany, A. M., Pyle, P., Anderson, S. D., Brown, A., and Block, B. A. (2007). Migration and habitat of white sharks (*Carcharodon carcharias*) in the eastern Pacific Ocean. *Marine Biology* **152**, 877–894. doi:10.1007/S00227-007-0739-4
- West, J. G. (1993). The Australian Shark Attack File with notes on preliminary analysis of data from Australian waters. In 'Shark Conservation'. (Eds J. Pepperrell, P. Woon, and J. West.) pp. 93–101. (Taronga Zoo: Sydney, NSW, Australia.)
- West, J. G. (2011). Changing patterns of shark attacks in Australian waters. *Marine and Freshwater Research* **62**, 744–754. doi:10.1071/MF10181

## **MacDonald, Jennifer**

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**From:** Joyce, Warren  
**Sent:** March-20-18 12:05 PM  
**To:** MacDonald, Jennifer; Bowlby, Heather  
**Subject:** RE: White Shark permit questions

Females are thought to mature at 4 -4.3 m, I believe males are smaller, around 3.5 m so I think 4.5 m would be considered young adults.

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**From:** MacDonald, Jennifer  
**Sent:** March-20-18 11:45 AM  
**To:** Bowlby, Heather; Joyce, Warren  
**Subject:** RE: White Shark permit questions

Hi Heather,

Thank you for the additional information – your help is greatly appreciated.

For the question of size, from the paper that Warren had previously provided, they indicated that impacts may be greater in sharks less than 450cm; I converted that to approximately 14 feet – does that sound like a reasonable size to describe a juvenile?

Thanks,  
Jenn

**Jennifer MacDonald**  
Species at Risk Management Division  
(902) 407-8175

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**From:** Bowlby, Heather  
**Sent:** March-19-18 11:49 AM  
**To:** MacDonald, Jennifer; Joyce, Warren  
**Subject:** RE: White Shark permit questions

Jenn,

[REDACTED] We would need vertebrae for aging, not scales.

H

---

**From:** Bowlby, Heather  
**Sent:** March-19-18 11:43 AM  
**To:** MacDonald, Jennifer; Joyce, Warren  
**Subject:** RE: White Shark permit questions

Hi Jenn,

There is quite a bit of research out there comparing internal/external tags, but it is predominantly with finfish where you might expect a higher mortality rate from the anesthesia and surgical implantation. Anyways, I have attached one recent paper comparing the two tag attachment methods in Red Drum as well as a paper describing white shark movements using externally attached acoustic tags from West Australia.

For size, the argument could be made relative to the fin-mounted SPOT tags in particular. Warren sent that paper on how the tags affected fin growth in juvenile animals. This would potentially give you a minimum size for tagging. I have nothing that could inform setting a maximum size.

For mortalities, if the carcass could be easily obtained (i.e. the shark was dead on the line, not floating in the water column) then it would be useful to have scale samples for aging as well as a bunch of detailed morphology samples.

Best,  
Heather

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**From:** MacDonald, Jennifer  
**Sent:** March-12-18 1:07 PM  
**To:** Bowlby, Heather; Joyce, Warren  
**Subject:** RE: White Shark permit questions

Sorry – I hit send too soon! Do you know if there are studies on the risks/impacts associated with internal vs. external acoustic tags?

Thanks!

**Jennifer MacDonald**  
Species at Risk Management Division  
(902) 407-8175

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**From:** MacDonald, Jennifer  
**Sent:** March-12-18 1:03 PM  
**To:** Bowlby, Heather; Joyce, Warren  
**Subject:** White Shark permit questions

Hi Heather and Warren,

I am continuing to work on the OCEARCH permit application and had a few outstanding questions that I was hoping you could advise on.

I remember in our last meeting, we discussed potentially restricting the size of sharks that could be caught. I had written down somewhere that we would restrict it to between 13 and 18 feet in total length, but I don't think that was right. Would you suggest that such a condition be included in the permit and if so, what would be your suggestion for the appropriate size?

I have also drafted a condition in the permit that requires further tagging be ceased if there is a mortality or significant injury during a tagging attempt (until further instructed by DFO).

Thanks so much,  
Jenn

**Jennifer MacDonald**

Species at Risk Biologist | Biologiste des espèces en péril

Species at Risk Management Division | Division de la gestion des espèces en péril

Ecosystem Management | Gestion des écosystèmes

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No information has been removed or severed from this page

**MacDonald, Jennifer**

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**From:** Gromack, Aimee  
**Sent:** March-21-18 9:50 AM  
**To:** MacDonald, Jennifer  
**Subject:** RE: chumming and human safety


FYI I just spoke to Donald briefly about this and he said he will bring it up during the call. Maybe they have things they have done in other jurisdictions around human safety.

---

**From:** Gromack, Aimee  
**Sent:** March-21-18 9:37 AM  
**To:** MacDonald, Jennifer  
**Subject:** chumming and human safety

Hi Jenn,

I was thinking about the human safety element of OCEARCH's proposal to chum in coastal waters (e.g., Mahone Bay). I made a note about this in the permit application but forgot to follow up with you. A film crew that chummed waters in South Africa for White Shark got some bad press around the death of a body boarder – people suggested this happened because of chumming. In reading about this issue more, it sounds like it is not typically an issue unless chumming happens regularly because white sharks can learn to associate humans with food. However, there are suggestions that chumming can bring sharks closer to humans than they would normally be, thereby increasing chances of an interaction.



Here is an informative interview with a shark researcher in Florida about this issue:

<https://www.aaas.org/blog/qualia/chumming-leading-more-shark-attacks>

I'd be happy to discuss this further.

Cheers,

**Aimee Gromack BSc, MMM**

*Species at Risk Biologist*

Species at Risk Management Division | Division de la gestion des espèces en péril  
Fisheries & Oceans Canada | Pêches et Océans Canada  
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[Aimee.Gromack@dfo-mpo.gc.ca](mailto:Aimee.Gromack@dfo-mpo.gc.ca)  
Tel | Tél. 902-426-0518 / Fax | Télécopieur 902-426-2331



## NOTE TO FILE

FILE NUMBER - NUMÉRO DE DOSSIER

CALL IN	CALL OUT	X	SITE VISIT	NOTE	TIME HEURE	DATE (Y-A - M - D-J)
NAMES OF PERSON(S) CONTACTED NOM(S) DE LA (DES) PERSONNE(S) CONTACTÉE(S)						2018-03-22

Chris Fischer, Bob Heuter, Ami Meite, Brian Francis (OCEARCH)  
Donald Humphrey, Jenn MacDonald (DFO)

### SUBJECT - OBJET

Input on permit application

### SUMMARY - RÉSUMÉ

OCEARCH requested a call to understand the permitting process/likelihood of a permit being issued.

Discussed a few outstanding questions on their permit application:

- Comparison of internal and external acoustic tags: Bob indicated that both tag types are available to OCEARCH; they use internal tags because there is less chance of shedding or fouling and the internal tags have a longer life span (may transmit for up to 5-10 years, while external tags may only transmit for one year). Bob further noted that implantation of the internal tags does not harm the sharks once it is implanted and transmitting. He also noted that veterinarians will do the surgical implantation/suturing. Chris also explained that the external tags can be eaten off by other fish.
- Use of 1 bolt versus 4 bolt SPOT tag attachment method: Chris indicated that the single bolt method reduces the timeframe that a tag will stay attached for (as females have a 2 year migratory loop, it is ideal to have a tag stay on for at least 4 years so that 2 cycles of migration can be tracked/compared). Chris further indicated that when OCEARCH has seen previously tagged sharks where the tags have become detached (7-10 years after tagging), they cannot tell on the fins that they were tagged; OCEARCH does not believe there is long term issues/behavioural issues with SPOT tagging. These are large animals and there is not a lot of fin trauma over time. The 4 bolt attachment method provides the most data from each animal, which minimizes the number of animals that need to be tagged. Further, the 1 bolt method requires that the tag be contained in a saddle, which decreases the hydrodynamics for the animal.
- Expedition leader – discussed that we need to know who the expedition leader/ lead scientist will be for the permit; Bob indicated he will be on board, although they would like a local /Cdn researcher to potentially be the chief scientist for the expedition. OCEARCH indicated that they may need a confirmed permit before they are able to have a researcher confirm their participation. For permitting purposes, will name Bob Heuter as the 'qualified individual'.
- Animal Care Protocol – there is a new committee at Jacksonville University; waiting for the first meeting to review OCEARCH's protocol (scheduled for April 15); will send as soon as completed.
- OCEARCH indicated that they are looking to collaborate with Cdn scientists (both sh.



researchers and others); they are open to using the boat/platform to assist with turtle or other research while in Canada. Donald will let Mike James know this. OCEARCH has offered up their vessel to right whale researchers in the U.S.

- Donald provided assurance to OCEARCH that a permit will be issued, we are just finalizing the details.
- Donald indicated that we will likely require an observer to be onboard; OCEARCH welcomes collaborators on board, open to other DFO participants.
- OCEARCH indicated that they will likely be applying for future permits for an additional 2-4 years of tagging if this expedition goes well/yields the data they are expecting.
- OCEARCH asked for information on applying for the Foreign Fishing Vessel License; Jenn will send this information.

CONCLUSION - CONCLUSIONS		ACTION TAKEN - SUITE DONNÉE		ACTION REQUIRED - SUITE À DONNER	
RECORDED BY ENREGISTRE PAR	NAME - NOM Jennifer MacDonald	DIVISION - DIVISION Species at Risk Management Division		TELEPHONE - TÉLÉPHONE 902-407-8175	

## MacDonald, Jennifer

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**From:** MacDonald, Jennifer  
**Sent:** March-22-18 3:11 PM  
**To:** Sooley, Darrin  
**Subject:** Call with OCEARCH

**Categories:** To file

Hi Darrin,

Just a quick update - we had a good call with OCEARCH this afternoon. I was able to discuss with them a few outstanding questions about the use of internal vs. external acoustic tags and the different attachment methodologies for SPOT tags (1 bolt vs. 4); based on that information I am going to make a few small edits to the Assessment and Approval Form and will resend it to you and Donald.

Donald also suggested that once both you and he are comfortable with the draft permit, we may want to share this with OCEARCH to ensure they are ok with all the conditions. Donald has the document and is reviewing it and I will share any edits from him with you.

We also discussed with them about having an observer on board and they welcomed that. We should discuss internally how much of the expedition we would require there being an observer for and who would be an appropriate person.

Cheers,

Jenn

### Jennifer MacDonald

Species at Risk Biologist | Biologiste des espèces en péril

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**MacDonald, Jennifer**

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**From:** Gromack, Aimee  
**Sent:** March-23-18 4:01 PM  
**To:** 'Chisholm, John (FWE )'  
**Subject:** RE: White Sharks in Canada with MDMF tags

Thanks John. [REDACTED]

Hope you have a great weekend, [REDACTED]

Best,

Aimee

---

**From:** Chisholm, John (FWE ) [mailto:john.chisholm@state.ma.us]  
**Sent:** March-22-18 8:28 AM  
**To:** Gromack, Aimee  
**Subject:** Re: White Sharks in Canada with MDMF tags

Hi Aimee,

[REDACTED]

I know Heather and Warren at DFO will be able to tag white sharks in Canadian waters and Greg and I are already collaborating with them.

Thanks,  
John

**From:** Gromack, Aimee <Aimee.Gromack@dfo-mpo.gc.ca>  
**Sent:** Tuesday, March 20, 2018 8:56 AM  
**To:** Chisholm, John (FWE)  
**Subject:** RE: White Sharks in Canada with MDMF tags

Hi John,

[REDACTED] Yes, there is a lot of mis-information about what is going on in our waters, we are hoping to be proactive about this before the white shark sighting season starts this year. We certainly hope that our DFO scientists can tag white sharks this year. In terms of OCEARCH getting a permit in Canada, a staff member is reviewing the permit application against standard SARA permit criteria. I am not sure the status of the permit application but I can give you a call when I hear more.

Best regards,

Aimee

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**From:** Chisholm, John (FWE ) [<mailto:john.chisholm@state.ma.us>]  
**Sent:** March-16-18 4:33 PM  
**To:** Gromack, Aimee  
**Subject:** Re: White Sharks in Canada with MDMF tags

[REDACTED]  
[REDACTED] (<http://www.marketwired.com/press-release/ocearch-concludes-shark-expedition-lowcountry-after-tagging-white-tiger-sharks-2206896.htm>)  
[REDACTED]

[REDACTED] As I've said in past e-mails to DFO the Canadian shark biologists are top notch, they should be the ones to tag white sharks up there. [REDACTED]  
[REDACTED]

Thanks,  
John

---

**From:** Gromack, Aimee <[Aimee.Gromack@dfo-mpo.gc.ca](mailto:Aimee.Gromack@dfo-mpo.gc.ca)>  
**Sent:** Friday, March 16, 2018 3:08 PM  
**To:** Chisholm, John (FWE)  
**Subject:** RE: White Sharks in Canada with MDMF tags

Thanks for clarifying John. [REDACTED] now that I know that you and Greg were involved with tagging them (which I also learned from the paper you sent). ☺

---

**From:** Chisholm, John (FWE ) [<mailto:john.chisholm@state.ma.us>]  
**Sent:** March-16-18 4:07 PM  
**To:** Gromack, Aimee  
**Subject:** Re: White Sharks in Canada with MDMF tags

Hi Aimee,

Three of the 22 were tagged on the Ocearch (Betsy, Katharine & Lydia). These sharks were all tagged under MA Marine Fisheries permits as part of our research so technically not Ocearch sharks [REDACTED]  
[REDACTED]

I don't have a current estimate of what percentage of our tagged sharks have been detected. We have so many tagged now it has dropped for sure. I'm definitely not accounting for Ocearch's sharks (Hilton, Savannah and George). They were tagged after they worked with us.

Thanks,

John

---

**From:** Gromack, Aimee <Aimee.Gromack@dfo-mpo.gc.ca>  
**Sent:** Friday, March 16, 2018 2:29 PM  
**To:** Chisholm, John (FWE)  
**Subject:** RE: White Sharks in Canada with MDMF tags

That's great, thank you John.

Were any of these 22 sharks tagged in collaboration with OCEARCH [REDACTED] I don't want to double-count any sharks...

Do you have any estimate of what proportion of your tagged sharks came to Canada? In the recovery strategy, we currently have this:

Approximately one quarter of White Sharks tagged in U.S. waters by between 2011 and 2013 [AG1] entered Canadian waters (Chisholm pers. comm. 2016).

I think I should add, "tagged by the MDMF" to the above sentence as I don't suspect you are accounting for whites tagged by OCEARCH...let me know.

Thanks again,

Aimee

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**From:** Chisholm, John (FWE ) [mailto:john.chisholm@state.ma.us]  
**Sent:** March-16-18 2:45 PM  
**To:** Gromack, Aimee  
**Subject:** Re: White Sharks in Canada with MDMF tags

Hi Aimee,

I'm still dealing with a few distractions but I can tell you we've had 22 of our sharks visit Canadian waters and 7 of those visited the Minas Passage. I suspect there will be others once we get all the data from Canadian receivers.

Thanks,  
John

---

**From:** Gromack, Aimee <Aimee.Gromack@dfo-mpo.gc.ca>  
**Sent:** Friday, March 16, 2018 1:29 PM  
**To:** Chisholm, John (FWE)  
**Subject:** RE: White Sharks in Canada with MDMF tags

Hi John,

How is the list of white sharks in Atlantic Canada coming along?

The paper you co-authored is really interesting with a lot of new revelations about white sharks. I will reference it in the recovery strategy. I look forward to hearing more about the great work you are all doing, including the population study results.

Thanks,

Aimee

---

**From:** Chisholm, John (FWE ) [<mailto:john.chisholm@state.ma.us>]  
**Sent:** March-06-18 3:14 PM  
**To:** Gromack, Aimee  
**Subject:** Re: White Sharks in Canada with MDMF tags

Hi Aimee,

Getting close to having a list for you but probably won't be today. The storm has thrown a big monkey wrench into work this week. In the meantime did you see our paper that came out about White Shark Movements in the Atlantic? You can find it here if you haven't seen it yet:

<http://www.int-res.com/articles/feature/m580p001.pdf>

Thanks  
John

---

**From:** Gromack, Aimee <[Aimee.Gromack@dfo-mpo.gc.ca](mailto:Aimee.Gromack@dfo-mpo.gc.ca)>  
**Sent:** Friday, March 2, 2018 7:59 AM  
**To:** Chisholm, John (FWE)  
**Subject:** RE: White Sharks in Canada with MDMF tags

That is fantastic! I really appreciate your help, thank you!

---

**From:** Chisholm, John (FWE ) [<mailto:john.chisholm@state.ma.us>]  
**Sent:** March-01-18 8:26 PM  
**To:** Gromack, Aimee  
**Subject:** Re: White Sharks in Canada with MDMF tags

Hi Aimee,

So sorry. I did get your e-mail and meant to reply last week then got wrapped up in other things. Good news is we just received some new detections from Canada yesterday. I'm compiling an updated list for you and should have it by Monday or Tuesday next week. I'm not sure off the top of my head how many sharks we have tracked up there but it's over a dozen for sure. I'll use your spreadsheet as a template to create a list of all the sharks.

Thanks,  
John

---

**From:** Gromack, Aimee <[Aimee.Gromack@dfo-mpo.gc.ca](mailto:Aimee.Gromack@dfo-mpo.gc.ca)>  
**Sent:** Thursday, March 1, 2018 11:52 AM  
**To:** Chisholm, John (FWE)  
**Subject:** White Sharks in Canada with MDMF tags

Hi John,

I am just following up on the email I sent on Feb 22. I tried to phone but your voicemail is full. I hope everything is ok.

Here is the email text in case you missed that email – hope to hear from you soon.

Hi John,

I hope all is well with you. Thanks for your email about these detections last year. [REDACTED] am getting caught up on the white shark file. The White Shark Recovery Strategy took a backseat to right whale issues while I was gone so I am now updating the document to include new white shark sightings and new records of tagged sharks that entered Atlantic Canadian waters.

I was hoping you could help me update information on the MDMF-tagged sharks in Canadian waters. In 2016 you stated that 8 of your tagged sharks entered our waters (including Jamison), but since then I have learned about Priya, Margaret, Andale and Pumpkin. I am not sure if the total in Atlantic Canada is now 10 or 12 – it depends if Priya and Andale were included in the 8 detections you previously mentioned. You also mentioned that 3 of these sharks came into the Minas Basin but it now seems that there are 5 including Pumpkin and Andale. In a [news article](#) about Pumpkin, Greg Skomal is quoted that there have been 6 great whites detected in the Minas Basin – is this correct, or should it read that there were 6 detections (5 white sharks)? You told me about the one that visited the area two years in a row so maybe this is referring to detections?

I have a spreadsheet in which I am trying to keep track of the white sharks in our waters – if you are willing or able to fill in some of the blanks it would be greatly appreciated. You will see there are 7 rows for sharks that I don't have any names for based on you telling me in 2016 that 7 sharks have entered our waters since 2011 – I am wondering if Andale and Priya are captured in these.

If you are not able to complete the blanks, maybe you can just tell me **total white sharks tagged by MDMF in Canadian waters** and the **total that entered the Minas Passage**.

Please feel free to call me. Thank you ever so much!

**Aimee Gromack BSc, MMM**  
*Species at Risk Biologist*

Species at Risk Management Division | Division de la gestion des espèces en péril  
Fisheries & Oceans Canada | Pêches et Océans Canada  
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[Aimee.Gromack@dfo-mpo.gc.ca](mailto:Aimee.Gromack@dfo-mpo.gc.ca)  
Tel | Tél. 902-426-0518 / Fax | Télécopieur 902-426-2331

[AG1]Updates?

## **MacDonald, Jennifer**

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**From:** MacDonald, Jennifer  
**Sent:** March-23-18 1:56 PM  
**To:** Sooley, Darrin  
**Subject:** RE: White shark permit - review  
**Attachments:** SARA Permit\_Assessment and Approval Form\_v3.docx

**Follow Up Flag:** Follow up  
**Flag Status:** Completed

Hi Darrin,

I made a few small edits to the Assessment and Approval form following our call with OCEARCH. The revised text is highlighted in yellow in the attached. I've also sent this to Donald for his input, so will send you a revised version if he has any other changes. He would really like to have this all signed off by end of next week, while you are still acting, as we would like to get this wrapped up.

Donald has also suggested that we may want to share a draft of the permit with OCEARCH to ensure all the conditions are acceptable before finalizing – what are your thoughts on this?

Thank you!

Jenn

**Jennifer MacDonald**  
Species at Risk Management Division  
(902) 407-8175

---

**From:** Sooley, Darrin  
**Sent:** March-20-18 3:40 PM  
**To:** MacDonald, Jennifer  
**Subject:** Re: White shark permit - review

Jenn I am in ottawa until friday I will pick up on friday. I have the permit rationale started but it will also need to be translated in to french before it can be sent to kristina.

Let me double check with our science on minimum size of samples sharks to make sure they have no objection. I agree adding a buffer on the timeline is good idea.

Darrin

Sent from my BlackBerry 10 smartphone on the Bell network.

---

**From:** MacDonald, Jennifer  
**Sent:** Tuesday, March 20, 2018 10:54 AM  
**To:** Sooley, Darrin  
**Subject:** RE: White shark permit - review

Hi Darrin,

Thanks so much for providing comments on this – very helpful!



In response to a couple of your comments:

-for the time limit, should we allow for an additional 5-10 minutes as a buffer as I imagine there is a few minutes of time spent raising the lift, etc. The application indicates that it is "usually" within 5-10 minutes of capture that they bring the shark on the lift; so rather than a total time of 25-30 minutes, should we increase this to a total time of 35-40 minutes? Does that seem reasonable or would you prefer to limit it to 30 minutes?

-regarding the question about the expedition leader, I am waiting for confirmation of that from OCEARCH and I will remind them that we need that in order to issue the permit when we talk to them this week.

For your comments on the permit itself, I am good with all your suggestions.

-for the area, I will indicate the broader regions (eg. Mahone Bay, Bay of Fundy) and then also add a condition to the body of the permit that the shall not attempt to tag sharks in other locations without first informing DFO.

-regarding the size range, this was related to a suggestion from Science that SPOT tags can have a greater impact on fin development in juveniles; rather than a size range as I had proposed in the documents, I've discussed more with Science and I think including a minimum size for tagging is more useful (based on a paper from SA re: fin impacts, we are proposing a minimum size of 14 feet). Does that sound reasonable to you?

For the permit rationale, my understanding from Kristina is that it can be provided after the permit is issued; we could confirm that with her.

Thanks again!

Jenn

**Jennifer MacDonald**

Species at Risk Management Division

(902) 407-8175

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**From:** Sooley, Darrin

**Sent:** March-16-18 10:44 AM

**To:** MacDonald, Jennifer

**Subject:** RE: White shark permit - review

Hi Jennifer:

I have reviewed the Draft Permit and Permit Assessment and Approval form and offer comment (in track changes as "Comment D#) on both documents as per the attached files.

As we discussed at the outset the intent is to issue separate (but very similar) S.73 SARA Permits one from Maritimes Region and one from NL Region, with these changes I think we are well on the way to doing so.

As promised I will try to draft the Permit Rationale and send to you later today. Unfortunately my duties as Acting Regional Manager SAR Program keep getting in the way ☺. It is my understanding that we will need to submit a bilingual permit rationale to Kristina Makkay for review and posting on the SARA Registry before we issue the permits.

If any questions with attached comments let me know.

Darrin

---

**From:** MacDonald, Jennifer

**Sent:** March-13-18 8:56 AM

**To:** Sooley, Darrin

**Subject:** RE: White shark permit - review

That would be great Darrin – thanks! If possible, I'd like to get them to Donald before our call with OCEARCH next week.  
Cheers,  
Jenn

**Jennifer MacDonald**  
Species at Risk Management Division  
(902) 407-8175

---

**From:** Sooley, Darrin  
**Sent:** March-13-18 8:16 AM  
**To:** MacDonald, Jennifer  
**Subject:** RE: White shark permit - review

Thanks Jenn:

I will try to finish the draft permit rationale and send to you before end of the week. I will review these two documents and let you know any thoughts and comments hopefully by the end of the week as well.

Cheers,

Darrin

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**From:** MacDonald, Jennifer  
**Sent:** March-12-18 2:05 PM  
**To:** Sooley, Darrin  
**Subject:** White shark permit - review

Hi Darrin,

Attached is the latest draft of the Assessment and Approval form for the OCEARCH permit application review, as well as a draft of the permit itself. I would appreciate if you could provide any comments. [REDACTED]  
perhaps we could touch base on this next week? There are a few items that still have comments included – I had a few follow-up clarifications for Science that I've flagged in the documents, [REDACTED]  
so I didn't want to delay sending this to you any longer.

We are still trying to confirm a time for a call with OCEARCH (it keeps getting rescheduled), but it won't be until at least next week, [REDACTED] I've flagged a couple of questions in the attached to raise on the call with them as well.

Thanks!  
Jenn

**Jennifer MacDonald**  
Species at Risk Biologist | Biologiste des espèces en péril  
Species at Risk Management Division | Division de la gestion des espèces en péril  
Ecosystem Management | Gestion des écosystèmes  
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Fisheries and Oceans Canada Pêches et Océans Canada

FILE NO: DFO-MAR-2017-17  
17-PNFL-00020

**Ecosystem Management – Assessment and Approval of  
Species at Risk Act (SARA) Section 73 Permit Application**

**1. APPLICANT INFORMATION**

Permit Renewal? ☐ Yes ☒ No  
Permit Amendment? ☐ Yes ☒ No  
Is this a multi-year permit application? ☐ Yes ☒ No  
If so, what is the starting year and ending year:  
Previous Permit Number(s): n/a

**Individual(s) or Organization to appear as the Licensee on the Permit**

Name: OCEARCH  
Contact: George Christopher Fischer  
Email: chris@oceanarch.org  
Address: 1790 Bonanza Drive, Suite 101B  
Park City, Utah, USA 84060  
Phone: 435-645-8990

The following individuals and those under their direct supervision may undertake the activities authorized by the permit:

Name	Organization
Robert Hueter	Mote Marine Laboratory

**2. ACTIVITIES INFORMATION**

a) **Listed Species Affected:** White Shark (*Carcharodon carcharias*), Atlantic population - Endangered

**b) Project Summary:**

OCEARCH is proposing to conduct scientific research on White Sharks in Canadian waters to provide information in relation to a number of questions, including understanding the role of coastal waters off Nova Scotia and Newfoundland in the life history of the White Shark population, the range of the White Shark population in the northwest Atlantic, the health of White Sharks inhabiting Canadian waters, and adaptations of White Sharks for northwest Atlantic waters.

OCEARCH is proposing to conduct a research expedition in Canadian waters in September/October 2018, involving a collaborative team of scientists who will be onboard and collecting data to support a number of research projects. Sharks will be caught and guided to a research platform on the M/V OCEARCH. Research procedures (sampling and tagging) will be carried out on board the vessel, following which the animals will be released live. OCEARCH has requested a permit to tag 20 sharks in Canadian waters based on their analysis that 60 sharks are required for their various research studies (20 young-of-the-year, 20 immature and 20 mature); to date OCEARCH has tagged 33 sharks in the north Atlantic.

**Actively attracting White Sharks to the fishing boat and the larger research vessel** will be carried out by placing chum in the water using a variety of techniques. Observers on board the vessel scan for signs of White Shark activity and OCEARCH also makes use of drones, to search for White Sharks. To attract sharks, a combination of chum bags, chum boxes, bait tanks, chum tubes and decoys are used.

Canada

The chum consists of whale blubber and oil, mackerel and tuna, and/or menhaden oil. OCEARCH will seek a marine mammal permit from DFO to authorize the use of marine mammal material in Canadian waters.

**White Sharks will be caught** from the fishing boat using a circle hook (20/0 or 27/0 with zero offset). The hooks will be rigged with a crossbar bite-blocker (30cm up the leader) to prevent the shark from swallowing the bait. The hook will be attached to stainless steel wire rope (3/32" or 1/8"); the leader is about 10m and will be attached to a braid rope with elasticity properties to reduce hard shock when the initial struggle ensues. Typically within 5-10 minutes of being caught, the White Shark is guided onto the hydraulic lift on the research vessel.

**White Sharks will be lifted out of the water** on a hydraulic lift that is lowered off the research vessel. The lift, which includes side guides and an end gate to prevent the shark from swimming off, will be lowered below the waterline and the shark guided on. The lift will then be slowly raised above the water. Once on the lift, the hook will be removed from the shark's jaw. Oxygenated seawater will be pumped through a hose and mouthpiece (allowing for simultaneous flushing of the gills on both sides of the head) into the shark's buccal cavity at all times while on the lift. The shark will be on its side for the initial 5-7 minutes (to take blood samples, implant the acoustic tag, perform ultrasound) then it is rolled to an upright position (to attach satellite tag). Other procedures undertaken while the White Shark is on the lift will be the collection of swabs (skin mucus, gill surface and cloacal swabs); collection of parasites, collection of semen, fecal, and muscle samples, as well as possibly urine samples if the animal urinates while on deck, and the collection of eye and tail measurements.

**Blood and tissue sampling** will be conducted while White Shark are onboard the vessel. A hypodermic puncture and biopsy punch will be used to obtain blood (<25ml), muscle (<5g), semen, and skin mucus samples.

**Implantation of internal acoustic tags** will be conducted by making a surgical incision to insert a sterilized transmitter (1cm x 6cm) into the coelomic cavity. The incision will be sutured and the sutures will be absorbed over a period of time. OCEARCH is proposing to insert the internal acoustic tags in every White Shark (up to 20) caught in Canadian waters under this permit application.

**Attachment of satellite tags** will be conducted by drilling and bolting Smart Position or Temperature (SPOT) tags on the leading edge of the first dorsal fin. The SPOT tags (Wildlife Computers Model SPOT-257) measure 162 x 57 x 20 mm and weigh 160 g. To attach the tag, four holes are drilled in the dorsal fin with an electric drill (drill bit will be cleaned and sterilized in alcohol before use). The tag will be attached with alcohol-sterilized nylon bolts, stainless locknuts and plastic spacers (standard hardware from the tag manufacturer). Tags will be coated with an antifouling compound. The hardware is designed to retain the tag for five years, after which it will fail and the tag will detach. OCEARCH is proposing to attach a SPOT tag to every White Shark (up to 20) caught in Canadian waters under this permit application.

Pop-up Satellite Archival Tags (PSAT) will be attached via a tether to a subdermal metal dart implanted in the shark's flank below the first dorsal fin. PSAT tags are provided to OCEARCH by a collaborator at the Woods Hole Oceanographic Institution. The number of tags has not been confirmed, but will likely be 4-6 tags. The PSAT tags will be attached, in addition to acoustic and SPOT tags, on 4-6 White Sharks.

OCEARCH is also potentially looking to use a prototype tag that is a combination of a PSAT and SPOT tag. The tag is attached via a darted tether in the same way as a PSAT tag. If these new prototype tags are available, they will be used instead of the PSAT tag on 4-6 White Sharks. As these are prototype tags, OCEARCH is proposing to use these tags in combination with the SPOT tags to validate the new tag's geolocation data.

c) Analysis of Proposed Activities:

<b>Location:</b> Atlantic Ocean				
Coastal Nova Scotia:				
<ul style="list-style-type: none"> <li>• Mahone Bay (44° 29.50' N / 64° 13.50' W and adjacent areas</li> <li>• Bay of Fundy (44° 54.00' N / 66° 32.50' W and adjacent areas</li> </ul>				
South Coast of Newfoundland:				
<ul style="list-style-type: none"> <li>• Placentia Bay (47° 05.00' N / 54° 32.00' W</li> </ul>				
Sable Island (43° 56.14' N / 59° 56.59' W)				
<b>Dates:</b> September 18-October 11, 2018				
Proposed Activity	Planned Effects/Outcome		Potential Incidental Effects/Outcome	
	Prohibitions that Apply	Likelihood of the prohibited impact(s)	Prohibitions that Apply	Likelihood of the prohibited impact(s)
Actively attracting White Sharks to a vessel (i.e., chumming)	Harass	Med	Harm Kill	Low Low
Capture of White Sharks	Harass Harm Capture	High Low High	Kill	Low
Lifting White Sharks out of the water	Harass Harm Capture	High Low High	Kill	Low
Blood and tissue sampling	Harass Harm Possess	Med Low High	Harm	Low
Implantation of internal acoustic tags	Harass Harm	Med Low	Kill	Low
Attachment of satellite tags -- SPOT tags	Harass Harm	Med Low	Kill	Low
Attachment of satellite tags -- PSAT tags	Harass Harm	Med Low	Kill	Low

Impacts to individual White Sharks would result from any distress associated with the approaching vessel, being caught and brought onboard the vessel and out of the water, the application of the different tag types and the collection of biological samples.

**Actively attracting White Sharks to a vessel (i.e., chumming)**

A number of studies suggest that the presence of chum may be linked to modification of White Sharks' normal swimming and/or hunting behaviours, although the effects are likely short term when chum is used for short term research projects.<sup>1</sup> It is possible that attracting a White Shark will cause the individual to stray from patrolling for food or from mating. Disturbance to normal feeding behaviours may result in energetic costs.<sup>2</sup>

There is a possibility that attracting sharks to the fishing boat or the research vessel may result in collisions between the shark and the vessel and that the presence of the vessel may cause behavioural changes.

<sup>1</sup> NOAA. 2014. Draft Programmatic Environmental Assessment of Potential White Shark Research and Education Projects within the Gulf of the Farallones and Monterey Bay National Marine Sanctuaries. [https://nmssanctuaries.blob.core.windows.net/sanctuaries-prod/media/archive/library/pdfs/gfrms\\_draft\\_white\\_shark.pdf](https://nmssanctuaries.blob.core.windows.net/sanctuaries-prod/media/archive/library/pdfs/gfrms_draft_white_shark.pdf)

<sup>2</sup> Semmens, J.M., Payne, N.L., Huveneers, C., Sims, D.W. & Bruce, B.D. 2013. Feeding requirements of White Sharks may be higher than originally thought. Sci. Rep. 3, 1471; DOI:10.1038/srep01471 (2013).

### **Catch of White Sharks**

Catch and release fishing is a source of stress to White Sharks due to the potential for long fight times (exhausting the individuals) and injury from wounds caused by the hooks. Long capture times have been known to kill bony fish and other sharks.<sup>3</sup> Physiological disruptions to fish result from the high anaerobic activity, muscle fatigue and time spent out of water caused by capture using most fishing techniques.<sup>4</sup>

Injury can result from the wound caused by the hook, although the extent of the tissue damage or injury will depend on the location of the hook and the type of gear. Sub-lethal injury can result from removing hooks or leaving them in place in the throat, esophagus or gut. In the short term, a hook in the mouth will cause a loss of blood, but the wound would be expected to heal within a year or less. Circle hooks are known to cause lower incidences of internal injury than conventional J hooks.<sup>5</sup>

Although not specific to White Shark, a study in Australia examined post release survival in Shortfin Mako by attracting individuals to a boat using chum, then using monofilament line and either J hooks or circle hooks to catch the sharks. The study showed that the length of the fight time did not impact survival. Circle hooks significantly reduced foul hooking. The study showed that hook choice affected the likelihood of mortality, while the species' is able to cope with long fight times and associated physiological responses to capture due to its endothermy and high aerobic scope.<sup>6</sup>

It has been suggested that sharks, in general, are capable of recovery from physiological stress associated with capture and that any mortality is more likely linked to the extent of any physical injuries.<sup>7</sup>

### **Lifting White Sharks out of the water**

The research platform is raised and the White Sharks are lifted from their natural, in-water environment. This removal from the water likely results in physiological stress and possible oxygen deprivation.

Lifting White Sharks out of the water, onto a hard raised platform, may create excessive pressure on tissues and organs that usually do not bear weight. This impact may be greater in larger individuals.

While there are concerns about damage to internal organs, there is no evidence reported of internal organs being crushed when sharks are removed from the water.<sup>8</sup> However, if sharks are thrashing on the deck, this could lead to internal injuries.

OCEARCH has taken blood samples in the first minute and the last minute on the lift for 120 White Sharks handled in this manner and found stress levels remain relatively low throughout the handling time. Higher amounts of stress due to capture were shown in very young White Sharks (however OCEARCH is not proposing to catch young sharks in Canadian waters).

### **Blood and tissue sampling**

The *Canadian Council on Animal Care Guidelines on Care and Use of Fish in Research* suggest that blood samples be up to 1ml/kg body size. The volume proposed to be collected by this project is well under this recommended amount.

The retention of the blood and tissue samples involves possession of parts of individuals.

### **Implantation of internal acoustic tags**

<sup>3</sup> NOAA 2014

<sup>4</sup> Skomal, G.B. 2007. Evaluating the physiological and physical consequences of capture on post-release survivorship in large pelagic fishes. *Fisheries Management and Ecology*, 14: 81-89

<sup>5</sup> NOAA 2014

<sup>6</sup> French R.P., Lyle J., Tracey S., Currie S., Semmens J.M. 2015. High survivorship after catch-and-release fishing suggests physiological resilience in the endothermic shortfin mako shark (*Isurus paucus*). *Conserv Physiol* 3: doi:10.1093/conphys/cov044.

<sup>7</sup> Skomal 2007

<sup>8</sup> NOAA 2014

Implanting internal acoustic tags requires making a surgical incision, from which there could be a risk of infection or causing harm to the individual.

#### **Attachment of satellite tags (SPOT and PSAT)**

In terms of physical injury associated with the tagging, shark species in general are very resilient to superficial cuts and have a tremendous capacity to heal from injury.<sup>9</sup> Similar and much more extensive lacerations occur frequently during mating behaviours, and one of the identifying characteristics of a mature female shark is deep scarring along her dorsal musculature. The tagging site is expected to close over very quickly with minimal effect on the animal, as has been observed in other species held in captivity after tagging.

Various studies have examined possible longer term effects of electronic tags or data loggers on the swimming efficiency of sharks, but results have been variable.<sup>10</sup> There may be a marginally increased drag while swimming due to the external tag.

A study from South Africa suggests that SPOT tags can cause permanent cosmetic and structural damage to the dorsal fins of White Sharks, depending on how long the tag is attached for. Tags that detach within 12-24 months did not seem to cause long term damage; while after 24 months permanent damage to the dorsal fin was reported. However, the study did not show that the damage to the dorsal fin resulted in impacts to long term survival or body growth.<sup>11</sup>

Research from Monterey Bay Aquarium also showed that real-time satellite tags attached with multiple bolts on juvenile White Sharks affects the growth of the dorsal fin (growing around the tag or causing a deflection to the tip of the fin). They suggested that there may be more of a reaction to the presence of the bolts and tag in growing tissue.<sup>12</sup>

OCEARCH has provided photographs of White Sharks observed years after tagging that show that the fins have healed and are functioning properly.

#### **Post Release Behaviour and Longer Term Effects**

Results from research in which White Sharks were caught and restrained using an in-water stretcher and then tagged, has shown a six to 48-hour recovery period for individuals after capture and tagging.<sup>13</sup>

Post-release behavioural studies by OCEARCH collaborating scientists using accelerometers attached to the sharks have shown recovery and resumption of natural swimming behaviour within approximately 6 hours after release.

Research conducted off the west coast of California that involved tagging 21 White Sharks (2007-2012), found that they resumed 'normal' behaviours after tagging, as determined by their migration patterns. These sharks were tagged with SPOT tags (using various methodology including being lifted onto a platform out of the water and being tagged while alongside the research boat).<sup>14</sup>

It has been suggested that catch and release of marine pelagic fish may have sublethal population level effects due to reduced individual fitness. However, as these population level effects are difficult to assess in highly migratory species with poorly understood life histories, this has not been quantified or studied in depth.<sup>15</sup>

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<sup>9</sup> NOAA 2014

<sup>10</sup> Hammerschlag N. 2011. A review of shark satellite tagging studies. *J. Exp. Mar. Biol. Ecol.* doi:10.1016/j.jembe.2010.12.012

<sup>11</sup> Jewell O.J.D., Woisel M.A., Gennari E., Towner A.V., Bester M.N. 2011. Effects of Smart Position Only (SPOT) Tag Deployment on White Sharks *Carcharodon carcharias* in South Africa. *PLoS ONE* 6(11): e27242. doi:10.1371/journal.pone.0027242

<sup>12</sup> NOAA 2014

<sup>13</sup> NOAA 2014

<sup>14</sup> NOAA 2014

<sup>15</sup> Skomal 2007

As little is known about White Shark mating behaviour, it is unknown whether tagging could have an impact on mating.<sup>16</sup>

There is anecdotal evidence of at least one White Shark having died following interactions with OCEARCH using the methods proposed here.

#### Summary

Based on the above assessment, the following activities have the potential to contravene the SARA prohibitions and therefore must be authorized under SARA:

- Actively attracting White Sharks to a vessel;
- Catching White Sharks and lifting individuals out of the water on a hydraulic lift;
- Collecting biological samples from White Sharks;
- Implanting internal acoustic tags; and
- Attaching SPOT and PSAT tags to White Sharks.

The effects that these activities may cause to White Sharks include:

- Capture and harassment of, and potentially harm to, individuals,
- Possession of samples from individuals, and
- Although unlikely, killing of, individuals.

The Species at Risk Management Division has concluded that the activities associated with the above project are likely to affect the **White Shark, Atlantic population**, in a manner that is prohibited by SARA, and therefore a SARA Section 73 permit is considered necessary to engage in the proposed activities.

### 3. REGULATORY ASSESSMENT OF APPLICATION

#### Necessity Assessment

Work through the following five questions to determine the appropriate action for DFO to take in response to the permit application.

1. Is it likely that one or more species listed on Schedule 1 of the SARA occurs at any of the locations identified for the proposed activities?

☒ Yes ..... **Go to next question**  
☐ No .....

**A SARA permit is not necessary. The applicant will be informed in writing and advised to ensure any other required authorizations are obtained before proceeding with the activities. Go to Assessment Summary.**

2. Are any of the SARA-listed species concerned considered an "Aquatic Species" as per the definition in the *Fisheries Act*?

☒ Yes ..... **Go to next question**  
☐ No .....

**The applicant will be directed to resubmit the application to the appropriate agency. Go to Assessment Summary.**

3. Are the locations at which any of the activities are proposed to take place under the jurisdiction of Fisheries and Oceans Canada?

☒ Yes ..... **Go to next question**  
☐ No .....

<sup>16</sup> NOAA 2014



The applicant will be directed to resubmit application to the appropriate agency. Go to Assessment Summary.

4. Is it certain or likely that performing any of the proposed activities will affect the SARA-listed species concerned in a way to contravene the general prohibitions of SARA (subsections 32(1), 32(2), section 33, subsections 36(1), 58(1), 60(1) and 61(1))?

☒ Yes ..... Go to next question  
☐ No .....

A SARA permit is not necessary. The applicant will be advised of this in writing. Go to Assessment Summary.

5. Do any of the exceptions listed in SARA Section 83 apply to the proposed activities concerned?

☐ Yes .....

A SARA permit is not necessary. The applicant will be advised of this in writing and the basis on which an exception applies will be described here. Go to Assessment Summary.

☒ No .....  
A SARA Section 73 permit is required to avoid contravention of the prohibitions of SARA. DFO will proceed with the application to assess eligibility. Go to Eligibility Assessment.

**Commented [JM1]:** s. 83(5d): Subsection 32(2) does not apply to a person who possesses an individual of a listed species or any part of an individual if the person acquired it by succession from someone who was entitled to possess it under this Act.

-other review forms have listed all those that will receive/possess samples

#### Eligibility Assessment

The following two questions assess whether the proposed activities are eligible for a SARA Section 73 permit.

1. Section 73(2): The purpose of the proposed activities is described by **one or more** of the following:

- ☒ The activity is scientific research relating to the conservation of SARA-listed species and will be conducted by qualified persons
- ☐ The activity benefits the species or is required to enhance its chance of survival in the wild.
- ☐ Affecting the SARA-listed species is incidental to carrying out the activity

The proposed activities aim to answer a number of research questions, both through the tracking of individual White Sharks that will be tagged and through analysis on blood and other tissue samples.

The draft Recovery Strategy for White Shark identifies the following as high priority research and management approaches:

- undertake scientific research to better understand population dynamics, distribution and habitat use.
- collect and maintain White Shark sightings information; maintain this information in a database and share via network

OCEARCH's Chief Science Advisor is Dr. Robert Hueter. He is the Director of the Center for Shark Research at the Mote Marine Laboratory and has more than 25 years experience in shark research.

☒ Yes ..... Go to next question

☐ No .....

The proposed activities are not eligible for a SARA Section 73 Permit. Go to Assessment Summary.

2. Section 73(3): The proposed activities meet **all** of the following pre-conditions:

- ☐ All reasonable alternatives to the activity that would reduce the impact on the species have been considered and the best solution has been adopted

In the consideration of alternatives to the proposed research, there are a number of alternatives that should be considered. The first alternative to consider would be to not undertake the activity and not conduct the research; however, given the many unknowns about the species this would not represent the best solution as it would be a loss of an opportunity to learn more.

There are no alternative locations to conduct the research, as it must be conducted within the range of the species.

In relation to the proposed activities, overall the applicant asserts that the methods and procedures proposed are the safest and most successful way of obtaining the necessary samples and attaching SPOT tags.

#### Attracting and Catching White Shark

- The alternative to chumming for White Shark is to not use chum, which would limit the ability to sight White Sharks to passive observations. Given the low numbers in a large area, chance encounters would be low, which would reduce or even eliminate the success rate of researchers attempting to deploy tags or obtain samples.

#### Catching, restraining and lifting the shark out of the water

- Alternative approaches include (1) attracting a shark and sampling/tagging it without restraining or catching it and (2) attracting a shark and catching it, but conducting sampling/attaching tags while the shark remains in the water.
- The following summarizes the type of tagging and sampling that is possible under each alternative:

	(1) No Capture	(2) Capture and Tag in Water	(3) Capture and Use of Lift
Tag Types	PSAT Acoustic (external)	SPOT PSAT Acoustic (external)	SPOT PSAT Acoustic (internal or external)
Other Samples	-- muscle samples	-- blood samples -- swabs (skin mucus) -- muscle samples	-- blood samples -- swabs (skin mucus, gill surface and cloacal swabs) -- muscle samples -- parasite samples -- semen samples -- fecal samples -- urine samples (opportunistic) -- eye/tail measurements -- ultrasound

- Under alternative (1), the success rate for tagging and collecting samples would likely be less than using one of the alternative methodologies, which involve catching the sharks. This approach can also require chasing the individuals with a small to mid-sized boat, which can increase stress levels. There is a risk with this approach that tags would not be attached properly.
- Under alternative (2), some researchers have suggested that keeping the shark in the water reduces the stress experienced by the shark as a result of being lifted from the water. However, OCEARCH has indicated that sharks are more likely to struggle if they remain in the water, while being on the lift quiets the animals and therefore they conclude that the proposed method reduces the potential for harm to the sharks. Sampling and tagging using an alongside-boat method requires calm sea conditions, which are often not encountered. Working alongside a boat with a large animal that is likely to be struggling also increases the risk to researchers.
- With respect to the precise methodology proposed to capture sharks, the approaches proposed

likely present the best alternative to reduce potential impacts. Alternatives would be to use a 'J' hook instead of a circle hook, to not use the bite blocker, to not embed the leaders in rope. However, all of these alternatives would increase the risk of internal (e.g., gut-hooking) or external (e.g., lacerations) injury to the sharks.

#### **Blood and tissue sampling**

- An alternative method to collecting biological samples, would be collect samples by harpoon, while the shark remains in the water. However, the collection of blood samples, swabs of the skin mucus, gill surface and cloacal, parasite collection and semen samples require catching and controlling the animal. Further, attempting to obtain samples in the water increases the risk of sample contamination, loss of sample and infections in the shark. Muscle samples are taken from the site of the PSAT tag attachment reducing sample wounds on the shark.

#### **Tagging**

- SPOT, PSAT and acoustic tags all collect different types of data:
  - SPOT tags transmit location and other data in real time. Information is transmitted while the tag is attached to the shark; the data signal from these tags is sent when the shark's dorsal fin is at the surface. SPOT tags may transmit data for up to 3-5 years. To obtain real-time geolocation data from an animal that is wide ranging within areas that are previously unknown, SPOT tags provide the best option for collecting this data.
  - Data from PSAT tags is stored on the device and retrieved after the tag detaches from the shark. PSAT tags will collect data for approximately one year. PSAT tags provide archived temperature and depth data, but the geolocation data is less precise and not available in real-time.
  - Acoustic tags are useful to detect the arrival of an animal in an area where underwater acoustic receivers have been deployed (typically well-studied inshore areas). These tags provide fine-scale geolocation data, but only in areas where there are acoustic receivers.
- OCEARCH has indicated that to understand an animal's large scale movements and migration, SPOT tags are the most effective in revealing the precise tracks and this data, in their perspective, cannot be substituted with data from PSAT or acoustic tags. Further, the real time data from SPOT tags support their educational and outreach objectives.
- There are alternative attachment methodologies for tags:
  - Acoustic tags can be attached externally rather than internally. While some researchers have successfully utilized externally attached acoustic tags, OCEARCH has indicated that there are concerns with the risk that external tags can be shed. In addition, internal tags have been shown to transmit for up to 5 years (and even up to 10 years), while external tags have a shorter lifespan of approximately 1 year. OCEARCH has further indicated that the internal tags do not cause on-going harm to sharks once implanted.
  - SPOT tags can also be attached as floating tags, however OCEARCH indicated concern that floating SPOT tags can be fouled, shed and lost from the animal very rapidly.
  - Other researchers have developed a technique to attach SPOT tags with a single bolt, rather than the four bolt attachment methodology proposed by OCEARCH. OCEARCH has indicated that their information indicates that the single bolt attachment has a shorter lifespan, limiting the data that can be collected. Additionally, the single bolt attachment requires a saddle in which the tag is placed when attached; this saddle may decrease hydrodynamics for the sharks on an on-going basis.

- ☒ All feasible measures will be taken to minimize the impact of the activity on the species or its critical habitat or the residence of its individuals

The following measures were proposed by OCEARCH to minimize the impacts of the activities:

- individuals will not be chased by the vessel, but will be attracted using chum;
- gear will be used that will minimize the chance that animals are gut-hooked (including using circle hooks and a crossbar bite-blocker);
- animal struggles and injury will be minimized by:

- using a leader attached to a braid rope with elasticity properties to help reduce hard shock during the initial struggle;
  - using a 10m leader length in case the shark rolls in the line to ensure that the shark cannot bite through the rope and escape (retaining the hook and leader);
  - embedding the leader inside a three-strand rope to give it a thicker diameter so that if the shark rolls, the thicker rope does not cut into the sharks' skin and is easier to unwrap;
  - using heavier tackle that keeps enough pressure on the shark so that the line is stretched tight and the shark cannot turn and roll.
- all research procedures will be conducted within 20 minutes;
- while on the research platform:
  - oxygenated seawater will be pumped through a hose and mouthpiece (allowing for simultaneous flushing of the gills on both sides of the head) into the shark's buccal cavity at all times;
  - a tail rope will be used to prevent the animal from causing harm to itself and others;
  - the head and eyes will be covered with wet terrycloth towel to reduce stress and keep eyes moist;
  - skin will be kept wet during in-air procedures to prevent drying;
  - animal stress will be monitored by observing skin colouration, presence of blood pooling, gill movements, and animal activity:
    - if stress is detected in the animal, a blood sample will be taken to evaluate the shark's conditions;
    - if acute stress is observed, the animal will be released immediately.
- OCEARCH is currently seeking approval of their animal care plan from Jacksonville University and will notify DFO once that the approved plan is in place.

In addition, the permit will require that:

- the total time of engagement with a single White Shark be limited to 40 minutes (from the time it is initially hooked until it is released);
- a maximum number of 20 White Sharks can be tagged;
- as the impact on fin development of attaching SPOT tags has been shown to be greater in juvenile sharks<sup>17</sup>, only White Sharks greater than 14 feet in total length can be caught and tagged;
- a DFO Scientist or Observer must be onboard throughout the duration of the expedition;
- work will cease and DFO will be contacted immediately if there is any mortality of a White Shark or if a White Shark receives any significant injury and no further attempts at catching or tagging White Sharks will be resumed until approved by DFO;
- all interactions with White Sharks (including location of capture/tagging events; number and gender/age of all White Sharks caught and tagged) and all mitigation measures employed will be reported to DFO. In addition, unsuccessful tagging attempts, in which White Sharks were observed but not caught or tagged, will also be reported to DFO (location, length estimate, gender (if visible), weight).

☒ The activity will not jeopardize the survival or recovery of the species

Tagging of White Sharks is unlikely to jeopardize the survival or recovery of the population. The recovery goal in the draft recovery strategy is to: "Maintain or increase the population of White Sharks that frequent Atlantic Canadian waters." No mortality is expected as a result of the activities, and therefore recovery will not be compromised. Even in the very unlikely event that mortality occurs during the activities, Science advice indicates that the population of White Sharks in the NW Atlantic is increasing and current mortality levels (due to incidental capture in fisheries) would have to increase substantially before population trajectories would be predicted to decline. Therefore there is a high likelihood that

<sup>17</sup> Jewell et al 2011

recovery goals can be achieved under various scenarios of allowable harm for White Shark, even if annual bycatch mortality increases from historical estimates.<sup>18</sup>

- ☒ Yes ..... **Go to Consultation Assessment**  
☐ No .....  
**The proposed activities are not eligible for a SARA Section 73 Permit. Go to Assessment Summary.**

#### **Consultation Assessment**

The following two questions assess whether consultation with an outside party is required before issuing a SARA Section 73 Permit for the proposed activities:

1. **Section 73(4):** Do the proposed activities concern a species in an area in respect of which a wildlife management board is authorized by a land claims agreement to perform functions in respect of wildlife species?  
☐ Yes ..... **Go to Assessment Summary**  
☒ No ..... **Go to next question**
2. **Section 74(5):** Do the proposed activities concern a species in a reserve or any other lands that are set apart for the use and benefit of a band under the Indian Act?  
☐ Yes ..... **Go to Assessment Summary**  
☒ No ..... **Go to Assessment Summary**

#### **Assessment Summary**

The above assessment is summarized below. In order to recommend that a SARA Section 73 Permit be issued for the proposed activities, the above assessment must demonstrate that doing so is warranted, lawful, and if applicable, that all consultation requirements of SARA s. 73(4) or 73(5) have been fulfilled.

1. The proposed activities warrant the need for a SARA Section 73 Permit.  
☒ Yes ..... **Go to next question**  
☐ No .....  
**A SARA permit is not necessary. The applicant will be advised of this in writing. Go to EM Permit Decision.**
2. The proposed activities are consistent with all of the eligibility requirements of SARA Section 73.  
☒ Yes ..... **Go to next question**  
☐ No .....  
**The proposed activities are not eligible for a SARA s.73 Permit. Go to EM Permit Decision.**
3. The permit decision, proposed activities, and any permit contents require consultation with an outside party.  
☐ Yes .....  
**Undergo consultation with the appropriate party before proceeding further in the permitting process.**  
☒ No .....  
**Issue a SARA s.73 Permit. Go to Ecosystem Management Permit Decision.**

<sup>18</sup> DFO. 2017. Evaluation of Scope for Harm for White Shark (*Carcharodon carcharias*) in Atlantic Canada. DFO Can. Sci. Adv. Sec. Sci. Resp. 2017/025.

#### 4. REVIEW

Input sought from:

Name	DFO Sector
Aimee Gromack	DFO Maritimes - SARMD
Heather Bowlby / Warren Joyce	DFO Maritimes - Science

#### 5. ECOSYSTEM MANAGEMENT PERMIT DECISION

☐ A SARA Section 73 Permit is not considered necessary to engage in the proposed activities.

☒ Issue SARA Section 73 Permit subject to the conditions outlined in the SARA Section 73 Permit for DFO-MAR-2017-17.

☐ Do not issue Section 73 Permit.

#### 6. SIGN-OFF

Reviewed by:

\_\_\_\_\_  
Donald Humphrey  
Regional Manager  
Species at Risk Management Division (Maritimes  
Region)

\_\_\_\_\_  
Date

\_\_\_\_\_  
Darrin Sooley  
Acting Regional Manager  
Species at Risk Management Division (Newfoundland  
and Labrador Region)

\_\_\_\_\_  
Date

## MacDonald, Jennifer

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**From:** MacDonald, Jennifer  
**Sent:** March-26-18 8:40 AM  
**To:** Sweet, Marilyn  
**Subject:** Marine mammal permit information

**Follow Up Flag:** Follow up  
**Flag Status:** Completed

Hi Marilyn,

I have a question I was hoping you may be able to help with - we are working on a SARA permit for OCEARCH to catch and tag white sharks. They have indicated that they plan to use chum, which may include marine mammal material (whale blubber and oil), to attract the sharks. The group is based in the U.S. and when they are chumming in U.S. waters they use marine mammal material from dead, stranded whales and received under a permit from NOAA. OCEARCH has asked us what permitting requirements may be necessary regarding marine mammals in Canada.

The planned expedition is Sept/Oct 2018 and they are planning to enter waters off both Maritimes and Newfoundland regions. We have already sent them the contact information for both regions for Licencing in order to apply for a s. 52 Licence and a Foreign Fishing Vessel Licence, but they have asked who to contact regarding any permitting for marine mammals. Do you have any guidance I can provide to them or someone I should put them in touch with?

Thank you so much,  
Jenn

### Jennifer MacDonald

Species at Risk Biologist | Biologiste des espèces en péril  
Species at Risk Management Division | Division de la gestion des espèces en péril  
Ecosystem Management | Gestion des écosystèmes  
Fisheries & Oceans Canada | Pêches & Océans Canada  
P.O. Box 1006 Dartmouth N.S. | C.P. 1006 Dartmouth N.E. B2Y 4A2  
Tel | Tél: (902) 407-8175 Fax | Téléc: (902) 426-2331  
Email | Courriel: [jennifer.macdonald@dfo-mpo.gc.ca](mailto:jennifer.macdonald@dfo-mpo.gc.ca)


## MacDonald, Jennifer

---

**From:** Chris Fischer <chris@oceanarch.org>  
**Sent:** March-26-18 9:37 AM  
**To:** MacDonald, Jennifer  
**Cc:** Bob Hueter; Bryan Franks; Fernanda Ubatuba  
**Subject:** Re: Permitting information

**Follow Up Flag:** Follow up  
**Flag Status:** Completed

Thank you very much.  
FYI, we have our MM permit from NOAA and have it stored for our use in the US.  
Grateful for all.  
Chris



Chris Fischer  
Founding Chairman  
Oceanarch  
[www.Oceanarch.org](http://www.Oceanarch.org)

On Mar 26, 2018, at 7:41 AM, MacDonald, Jennifer <[Jennifer.MacDonald@dfp-mpo.gc.ca](mailto:Jennifer.MacDonald@dfp-mpo.gc.ca)> wrote:

Hi Chris,  
I am working on finding out the information for you regarding marine mammal permitting; my primary contact is away from the office for the next couple of days, but I will hopefully have some more information for you soon.  
Regards,  
Jenn

**Jennifer MacDonald**  
Species at Risk Management Division  
(902) 407-8175

---

**From:** Chris Fischer [<mailto:chris@oceanarch.org>]  
**Sent:** March-22-18 3:57 PM  
**To:** MacDonald, Jennifer  
**Cc:** Bob Hueter; Fernanda Ubatuba  
**Subject:** Re: Permitting information

Jen,  
Thank you for the info below.  
Who should we contact regarding Marine Mammal?  
Hopefully they work with NOAA.  
We have a great working relationship with them.  
Enjoyed the call and look forward to meeting in person.



Best,  
chris

CHRIS FISCHER | Expedition Leader | Founding Chairman

**P: 435.645.8990 | F: 435.645.7077 | BE  
ENGAGED: OCEARCH.ORG**

<image001.jpg>

On Mar 22, 2018, at 12:03 PM, MacDonald, Jennifer  
<[Jennifer.MacDonald@dfo-mpo.gc.ca](mailto:Jennifer.MacDonald@dfo-mpo.gc.ca)> wrote:

Hi Bob and Chris,

Thank you for a good conversation this afternoon and the additional information you provided us.

As a follow-up to your question about other permitting or approvals required, you will require a licence under Section 52 of the Fishery (General) Regulations, which are licences issued for educational, experimental, public display or scientific purposes. The latest version of the application form can be obtained by emailing: [RegionalLicensing.XMAR@dfo-mpo.gc.ca](mailto:RegionalLicensing.XMAR@dfo-mpo.gc.ca) (this is the same email address to which completed applications can be sent). I believe that this same group may also process the Foreign Fishing Vessel Licences, which are issued under the Coastal Fisheries Protection Regulations. I would advise that you contact the Licencing office to ask about both applications. This contact information is for the Maritimes Region of DFO (off the coast of Nova Scotia); you will also need to apply separately for these permits from Newfoundland Region. I have copied Darren on this message as he can confirm the contact in Newfoundland Region. This is likely why it seemed that you were referring to two applications that sounded similar when we were discussing by phone – those would likely have been the two Section 52 Licence applications for the respective regions.

Should you be using marine mammal material in the chum, you may also need approval under the Marine Mammal Regulations.

Best regards,  
Jenn

**Jennifer MacDonald**

Species at Risk Biologist | Biologiste des espèces en péril  
Species at Risk Management Division | Division de la gestion des espèces en péril  
Ecosystem Management | Gestion des écosystèmes  
Fisheries & Oceans Canada | Pêches & Océans Canada  
P.O. Box 1006 Dartmouth N.S. | C.P. 1006 Dartmouth N.E. B2Y 4A2  
Tel | Tél: (902) 407-8175 Fax | Téléc: (902) 426-2331  
Email | Courriel: [jennifer.macdonald@dfo-mpo.gc.ca](mailto:jennifer.macdonald@dfo-mpo.gc.ca)

## MacDonald, Jennifer

---

**From:** MacDonald, Jennifer  
**Sent:** March-26-18 3:28 PM  
**To:** Sooley, Darrin  
**Subject:** RE: Draft Permit Rationale  
**Attachments:** OCEARCH permit rational NLSAR-001-18\_JM comments.doc

**Follow Up Flag:** Follow up  
**Flag Status:** Completed

Hi Darrin,  
Thanks so much for pulling this together – much appreciated. I've inserted some comments. If you are ok with the changes, then I will need to have Donald review this as well before we send for translation. Can you send me a final version of it once you've confirmed with Mark Simpson. We'll have to make sure that any changes we make here continue to match the approval document and the permit itself as well.  
Thanks again!  
Jenn

**Jennifer MacDonald**  
Species at Risk Management Division  
(902) 407-8175

---

**From:** Sooley, Darrin  
**Sent:** March-24-18 1:59 PM  
**To:** MacDonald, Jennifer  
**Subject:** Draft Permit Rationale

Hey Jennifer:

I finally found time [REDACTED] to draft the permit rationale relative to the OCEARCH permit.

It is attached for your review please take note to the [REDACTED] sections this is where I need information from you. The yellow highlighted sections require French translation before the rationale can be sent to Kristina for posting. I may also send to Mark Simpson to make sure he has no further comments / things to add.

Please let me know any comments that you may have so I can finalize and send for translation.

Regards,

*Darrin*

**Regional or Local Number:** NLSAR-001-18 (PATH: 17-PNFL-00020)

DFO-MAR-2017-17 (PATH: 17-PMAR-00018)

**Explanation for:** SARA Permit

Notice is hereby given that pursuant to the provisions of section 73 of the *Species at Risk Act* permits No. NLSAR-001-18 ~~is~~ are issued.

**Start or Issue Date:** 2018-XX-XX

**End or Expiry Date:** 2018-10-31

**Purpose:**

The activity is scientific research relating to the conservation of the species and conducted by qualified persons.

**English Description of Activity**

The purpose of the activity is to conduct scientific research on White Sharks in Canadian waters to gain a better understanding of the role of Canadian waters in the life history of the White Shark population in the northwest Atlantic Ocean, the range of the species within Canadian waters and health of White Sharks. The researchers will attach acoustic and satellite tags, as well as collect various biological samples, from up to 20 sharks in Canadian waters.

Researchers with ~~OCEARCH~~ will use chum to attract White Sharks in the study area to the fishing boat and larger research vessel. When a White Shark is sighted, either visually or using a drone, the fishing boat will target its fishing activities to attract and capture that shark. Chum bags, chum boxes, bait tanks, chum tubes and decoys may all be used to attract White Sharks to the fishing vessel. Once a White Shark is in the vicinity of the fishing vessel, the researchers will attempt to catch the shark using a 20/0 circle hook (zero offset) with a bite-blocker attached. In the case of a very large White Shark, a 27/0 circle hook (zero offset) with a buoy to prevent swallowing of the hook will be used. Once caught, the White Shark will be guided onboard the hydraulic lift on the research vessel, which is then raised above the waterline. While on the lift, sharks will be provided with oxygenated seawater via a mouthpiece and tube.

**Commented [DF01]:** I think that we are not supposed to identify the group that is permitted in the description

Once on the lift, internal acoustic tags will be implanted surgically in the coelomic cavity and the incision will be sutured. Smart Position and Temperate (SPOT) tags will be attached on the leading edge of the first dorsal fin by drilling four holes in the dorsal fin with an electric drill and attaching the tag with nylon bolts, stainless steel locknuts and plastic spacers. The hardware is designed to retain the tag for five years after which it will fail and the tag will detach. All White Sharks caught, up to 20, will have both acoustic and SPOT tags applied. Pop-up Archival Satellite Tags (PSAT) will be attached via a tether to a subdermal metal dart implanted in the shark's flank below the first dorsal fin. PSAT tags will be attached to up to 6 White Sharks caught.

The ~~OCEARCH~~ researchers will also collect samples (blood, muscle, semen, fecal and urine

s.21(1)(b)

samples), conduct skin, gill and cloacal swabs, collect parasites, collect eye and tail measurements, and perform an ultrasound (females). Samples will be collected using a hypodermic puncture and biopsy punch.

The activities authorized by the permits include:

- Actively attracting White Sharks to a vessel;
- Catching White Sharks and lifting individuals out of the water on a hydraulic lift;
- Collecting blood and tissue samples;
- Implanting internal acoustic tags; and
- Attaching SPOT and PSAT tags.

#### French Description of Activity

<French Translations is required for the information presented in the previous section.>

#### Issuing Authority

Fisheries and Oceans Canada NL Region and Maritimes Region

#### Authority Used

*Species at Risk Act*

#### English Pre-Conditions:

##### a) Alternatives

The proposed activities aim to answer a number of research questions, both through the tracking of individual White Sharks that will be tagged and through analysis on blood and other tissue samples.

Scientific research to better understand White Shark population dynamics, distribution and habitat use and to collect and maintain White Shark sightings information are high priority areas for research.

This planned research project is consistent with the research and management approaches included in the draft recovery strategy for this species.

The planned use of circle hooks to capture White Ssharks will reduce the risk of foul hooking. In general sharks are capable of recovery from physiological stress associated with capture; mortality due to capture is not anticipated. With respect to the planned lifting of captured sharks out of the water and onto a cradle-lift, the risk of internal injury related to this aspect of the planned study is likely to be low. The researchers ~~OCEARCH~~ have taken blood samples from White ~~sharks~~ Sharks in previous research programs (up to 120 animals) and it has been shown that stress levels remain low within captured White Ssharks. The volume of blood to be collected during the planned research is in keeping with *Canadian Council on Animal Care Guidelines on Care and Use of Fish in Research*. In terms of physical injury associated with the tagging, shark species in general are very resilient to superficial cuts and have a tremendous capacity to heal from injury. As such the tagging site is expected to heal quickly with minimal effect on the tagged individual. Post-release behavioural studies ~~by OCEARCH~~ during previous White Shark research programs have shown recovery and resumption of natural swimming behaviour by sharks within approximately 6 hours after release.

In relation to the proposed activities, overall the applicant asserts that the methods and procedures proposed are the safest and most successful way of obtaining the necessary samples and attaching SPOT tags. There are no alternative locations to conduct the research, as it must be conducted within the range of the species.

The proposed activities are the best means to gather the anticipated information and data. The likelihood of mortality will be low.

#### **b) Measures to minimize impact**

~~OCEARCH's~~ Research personnel are experienced in the study, capture and recovery of White sSharks using the methods planned for this research program. ~~OCEARCH's Chief Science Advisor Dr. Robert Heuter has more than 25 years of experience in shark research.~~ The following measures will be implemented to minimize impacts of planned research activities:

- Individuals will not be chased by the vessel, but will be attracted using chum;
- Gear will be used that will minimize the chance that animals are gut-hooked (including using circle hooks and a crossbar bite-blocker);
- Animal struggles and injury will be minimized by:
  - using a leader attached to a braid rope with elasticity properties to help reduce hard shock during the initial struggle;
  - using a 10 m leader length in case the shark rolls in the line to ensure that the shark cannot bite through the rope and escape (retaining the hook and leader);
  - embedding the leader inside a three-strand rope to give it a thicker diameter so that if the shark rolls, the thicker rope does not cut into the sharks' skin and is easier to unwrap;
  - using heavier tackle that keeps enough pressure on the shark so that the line is stretched tight and the shark cannot turn and roll.
- All research procedures will be conducted within 20 minutes of the White Shark being placed on the research platform;
- While on the research platform:
  - oxygenated seawater will be pumped through a hose and mouthpiece (allowing for simultaneous flushing of the gills on both sides of the head) into the shark's buccal cavity at all times;
  - a tail rope will be used to prevent the animal from causing harm to itself and others;
  - the head and eyes will be covered with wet terrycloth towel to reduce stress and keep eyes moist;
  - skin will be kept wet during in-air procedures to prevent drying;
  - animal stress will be monitored by observing skin colouration, presence of blood pooling, gill movements, and animal activity;
  - if stress is detected in the animal, a blood sample will be taken to evaluate the shark's conditions;
  - if acute stress is observed, the animal will be released immediately.

#### **c) Effects on survival and recovery**

s.21(1)(b)

The proposed activities will not jeopardize survival or recovery of the listed species due to low risk of long term or permanent injury or death and will not impact on the species' habitats or prey. No mortality is expected.

As such it is unlikely that White sShark recovery will be compromised.

**French Pre-Conditions:**

**a) Solutions de rechange**

<French Translation is required for Section a above>

**b) Mesures visant à réduire au minimum les impacts**

<French Translation is required for Section b above>

**c) Effets sur la survie ou le rétablissement de l'espèce**

<French Translation is required for Section c above>

**English Terms and Conditions**

**Commented [DF02]:** I don't think we usually include this section in our Mar region permit explanations (as I think it's optional).

The activities must be carried out in accordance with the following conditions:

**General Conditions:**

A copy of this permit shall be kept on site at all times in the possession of the Permit Holder or a person acting under the Permit Holder's authority, and shall be made available to an enforcement officer upon request. All persons undertaking the activities under the authority of the Permit Holder shall do so under the direction and oversight of the Permit Holder and shall be made familiar with the conditions of this permit. The activities must comply with the conditions identified within this permit. Activities that affect individuals of species at risk, their residences, or their critical habitat, other than those specifically identified within this permit are not authorized under this permit. No changes to the permitted activities shall take place without prior written approval from:

Species at Risk Management Division  
Fisheries and Oceans Canada - NL Region  
P.O. Box 5667, St. John's NL A1C 5X1  
Email: [SARANL-LEPTNL@dfo-mpo.gc.ca](mailto:SARANL-LEPTNL@dfo-mpo.gc.ca)  
Phone (709) 772-2443 / fax (709) 772-5562.

Species at Risk Management Division  
Fisheries and Oceans Canada – Maritimes Region  
P. O. Box 1006 Dartmouth NS B2Y 4A2  
Email: [SpeciesatRisk.xmar@dfo-mpo.gc.ca](mailto:SpeciesatRisk.xmar@dfo-mpo.gc.ca)  
Phone: 1-866-891-0771 Fax: (902) 426-2331

**Conditions to avoid or minimize the impact of the activities on the species:**

To the extent possible, activities shall be conducted in a manner whereby any individuals of the species shall be handled only in the circumstances authorized under this permit and with the least amount of harm. Only individuals that are experienced in tagging large pelagic fishes shall tag White Sharks. White Sharks shall not be chased by the vessel. The following gear shall be used; circle hooks (either 20/0 or 27/0 with zero offset) rigged with a cross bar bit-blocker (30cm up the leader) and attached to a stainless steel wire rope (3/32" or 1/8"). The leader shall be 10m in length and shall be attached to a braid rope with elasticity properties. Leaders shall be embedded inside a three-strand rope to increase the diameter. Individual White Sharks shall not be kept on the research platform for longer than 20 minutes. While on the research platform, oxygenated seawater shall be pumped through a hose and mouthpiece into the shark's buccal cavity at all times. While on the research platform, a tail rope shall be used to prevent the animal from causing harm to itself and others. While on the research platform, the head and eyes shall be covered with wet terrycloth towel to reduce animal stress and keep eyes moist. While on the research platform, the skin shall be kept wet. While on the research platform animal stress shall be monitored by observing skin colouration, presence of blood pooling, gill movements, and animal activity. If acute stress is observed, the animal shall be released immediately. [REDACTED] No more than 20 White Sharks, in total, shall be tagged.

2.13.—No attempts shall be made to tag White Sharks that are injured or behaving abnormally. Only White Sharks ~~between 13 and 18~~ greater than 3.5 metres feet-in total length shall be caught and tagged. A DFO representative shall be onboard as an observer during the expedition. In the event of a mortality or significant injury being sustained by a White Shark during a tagging attempt, all further attempts at tagging shall cease and DFO shall be contacted immediately (as per contact information provided within the above noted General Conditions). No further attempts at catching or tagging White Sharks shall be resumed until approved by DFO.

**Conditions that relate to monitoring and reporting:**

The Permit Holder shall monitor the effects of the activities and the avoidance and mitigation measures and standards referred to in this permit to determine whether they were conducted according to the conditions of this permit, and were successful at avoiding and mitigating the impacts of the permitted activities on the species.

On or before ~~January~~ December 31st, 2019 ~~2018~~, irrespective of whether the Permitted activities took place, a SARA Section 73 Permit Report shall be completed and returned to the Species at Risk Management Division – Maritimes Region and NL Region - using the contact information provided above in the General Conditions section. Without limiting the generality of the foregoing, the report shall contain the following information, to the satisfaction of DFO in its sole discretion:

- Information to demonstrate that measures and standards to avoid and mitigate the impacts of the permitted activities on the species were implemented according to the conditions of this permit;
- an assessment of whether these measures and standards were successful at avoiding and mitigating the impacts of the permitted activities on the species;

**Commented [DFO3]:** This is the date I had in the permit; but I can change back to January if you prefer?

- details of any contingency measures that were followed to prevent impacts greater than those authorized by this permit; date, time, location, length, size, gender (specify if females are pregnant or not), condition of the individual; and identify if tagging was attempted or undertaken on that individual; and
- provide details of any tagging attempts, including whether tagging was successful, unplanned or unexpected impacts on the shark, reaction of the shark to the tagging, and lessons learned.

**French Terms and Conditions** (optional)

L'activité doit être exercée conformément aux conditions suivantes:

**Conditions générales:**

<French Translation of information provided above in the section titled "General Conditions" is required here>

**Conditions à respecter pour éviter ou minimiser les conséquences négatives des activités sur l'espèce:**

<French Translation of information provided above in the section titled "Conditions to avoid or minimize the impact of the activities on the species" is required here>

**Conditions relatives à la surveillance et à la production de rapports:**

<French Translation of information provided above in the section titled "Conditions that relate to monitoring and reporting" is required here>

**English Other Relevant Information** (optional)

**French Other Relevant Information** (optional)

**Locations of Activity:**

*Newfoundland and Labrador:*

- *South Coast - Placentia Bay (47° 05.00' N / 54° 32.00' W)*

*Nova Scotia:*

- *Mahone Bay (44° 29.50' N / 64° 13.50' W and adjacent areas*
- *Bay of Fundy (44° 54.00' N / 66° 32.50' W and adjacent areas; and*
- *Sable Island (43° 56.14' N / 59° 56.59' W)*

**Affected Species**

Common Name	Scientific name/Nom scientifique
White shark (Atlantic population)	<i>Carcharodon carcharias</i>

**Contact Information**

Species at Risk Program



Fisheries and Oceans Canada – NL Region  
PO Box 5667 St. John's NL A1C 5X1  
Telephone: 709-772-2443  
Fax: 709-772-5562  
[SARANL-LEPTNL@dfo-mpo.gc.ca](mailto:SARANL-LEPTNL@dfo-mpo.gc.ca)

Species at Risk Management Division  
Fisheries and Oceans Canada – Maritimes Region  
P. O. Box 1006 Dartmouth NS B2Y 4A2  
Telephone: 1-866-891-0771  
Fax: 902-426-2331  
[SpeciesatRisk.xmar@dfo-mpo.gc.ca](mailto:SpeciesatRisk.xmar@dfo-mpo.gc.ca)  
Email: [REDACTED]  
Phone: [REDACTED] Fax: [REDACTED]

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## **MacDonald, Jennifer**

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**From:** MacDonald, Jennifer  
**Sent:** March-27-18 8:16 AM  
**To:** Sooley, Darrin  
**Subject:** RE: Draft Permit Rationale

That sounds great – thanks Darrin! I will still run this past Donald first so that we don't have to update any translations if he has suggested changes.

Cheers,  
Jenn

**Jennifer MacDonald**  
Species at Risk Management Division  
(902) 407-8175

---

**From:** Sooley, Darrin  
**Sent:** March-27-18 7:52 AM  
**To:** MacDonald, Jennifer  
**Subject:** RE: Draft Permit Rationale

Jennifer

I will make these changes and waiting to hear back from Mark. I was going to get the translation completed after which the permit rationale I assume could be used for both permits, rather than you getting translation and us getting translation?

Darrin

---

**From:** MacDonald, Jennifer  
**Sent:** March-26-18 3:58 PM  
**To:** Sooley, Darrin  
**Subject:** RE: Draft Permit Rationale

Hi Darrin,  
Thanks so much for pulling this together – much appreciated. I've inserted some comments. If you are ok with the changes, then I will need to have Donald review this as well before we send for translation. Can you send me a final version of it once you've confirmed with Mark Simpson. We'll have to make sure that any changes we make here continue to match the approval document and the permit itself as well.  
Thanks again!  
Jenn

**Jennifer MacDonald**  
Species at Risk Management Division  
(902) 407-8175

---

**From:** Sooley, Darrin  
**Sent:** March-24-18 1:59 PM  
**To:** MacDonald, Jennifer  
**Subject:** Draft Permit Rationale

Hey Jennifer:

I finally found time [REDACTED] to draft the permit rationale relative to the  
OCEARCH permit.

It is attached for your review please take note to the [REDACTED] sections this is where I need information from  
you. The yellow highlighted sections require French translation before the rationale can be sent to Kristina for posting. I  
may also send to Mark Simpson to make sure he has no further comments / things to add.

Please let me know any comments that you may have so I can finalize and send for translation.

Regards,

*Darrin*

## MacDonald, Jennifer

---

**From:** Robert Hueter <rhuetter@mote.org>  
**Sent:** March-28-18 10:42 AM  
**To:** Sooley, Darrin; Chris Fischer  
**Cc:** MacDonald, Jennifer  
**Subject:** Re: Permitting information

Thanks Darrin. We're chasing our tail a bit down here, having now been told by the Maritimes Region Licensing Office that we don't need a Section 52 license, but instead must pursue licensing through the U.S. State Department. We're following up on that now. We will also file the paperwork with Parks Canada to work near Sable Island.

Thanks for all your help with this process.

Bob

### **ROBERT E. HUETER, Ph.D.**

*Senior Scientist & Director, Center for Shark Research  
Perry W. Gilbert Chair in Shark Research  
Manager, Sharks & Rays Conservation Research Program  
Mote Marine Laboratory  
1600 Ken Thompson Parkway  
Sarasota, FL 34236 USA*

[rhuetter@mote.org](mailto:rhuetter@mote.org)  
Tel: 941-388-1827  
Fax: 941-388-4312  
More info at: [www.mote.org](http://www.mote.org)

On 3/24/2018 12:10 PM, Sooley, Darrin wrote:

Hello Bob and Chris:

Further to Jennifer's email below the contact information for DFO NL Region with respect to Section 52 licensing requirements can be found in the January 8, 2018 email that Jennifer sent to you all which I have attached for ease of reference.

Regards,

**Darrin R. Sooley**

A/ Regional Manager  
Species at Risk | Espèces en Péril  
Ecosystems Management | Gestion des écosystèmes  
Fisheries and Oceans Canada | Pêches et Océans Canada  
Northwest Atlantic Fisheries Centre |  
Centre des Pêches de l'Atlantique Nord-Ouest  
80 East White Hills Road | 80, route White Hills est  
PO Box 5667 | CP 5667  
St. John's NL A1C 5X1 Canada

Telephone | Téléphone: (709) 772-3521

Fax | Télécopieur: (709) 772-5562

Email: [darrin.sooley@dfo-mpo.gc.ca](mailto:darrin.sooley@dfo-mpo.gc.ca)

---

**From:** MacDonald, Jennifer  
**Sent:** March-22-18 3:34 PM  
**To:** Robert Hueter; Chris Fischer  
**Cc:** Sooley, Darrin  
**Subject:** Permitting information

Hi Bob and Chris,

Thank you for a good conversation this afternoon and the additional information you provided us.

As a follow-up to your question about other permitting or approvals required, you will require a licence under Section 52 of the Fishery (General) Regulations, which are licences issued for educational, experimental, public display or scientific purposes. The latest version of the application form can be obtained by emailing: [RegionalLicensing.XMAR@dfo-mpo.gc.ca](mailto:RegionalLicensing.XMAR@dfo-mpo.gc.ca) (this is the same email address to which completed applications can be sent). I believe that this same group may also process the Foreign Fishing Vessel Licences, which are issued under the Coastal Fisheries Protection Regulations. I would advise that you contact the Licencing office to ask about both applications. This contact information is for the Maritimes Region of DFO (off the coast of Nova Scotia); you will also need to apply separately for these permits from Newfoundland Region. I have copied Darren on this message as he can confirm the contact in Newfoundland Region. This is likely why it seemed that you were referring to two applications that sounded similar when we were discussing by phone – those would likely have been the two Section 52 Licence applications for the respective regions.

Should you be using marine mammal material in the chum, you may also need approval under the Marine Mammal Regulations.

Best regards,  
Jenn

**Jennifer MacDonald**

Species at Risk Biologist | Biologiste des espèces en péril

Species at Risk Management Division | Division de la gestion des espèces en péril

Ecosystem Management | Gestion des écosystèmes

Fisheries & Oceans Canada | Pêches & Océans Canada

P.O. Box 1006 Dartmouth N.S. | C.P. 1006 Dartmouth N.E. B2Y 4A2

Tel | Tél: (902) 407-8175 Fax | Téléc: (902) 426-2331

Email | Courriel: [jennifer.macdonald@dfo-mpo.gc.ca](mailto:jennifer.macdonald@dfo-mpo.gc.ca)

## MacDonald, Jennifer

---

**From:** Farr, Connie  
**Sent:** March-28-18 12:05 PM  
**To:** MacDonald, Jennifer  
**Cc:** Quinsey, Kira  
**Subject:** RE: Clarification regarding s.52 Licence applications

Jennifer, the foreign vessel licence is issued in place of the section 52 licence to foreign states. There is a condition to attach the SARA permit to their foreign vessel conditions in the foreign licence. Section 52 licences are issued only for domestic research or for foreign research without the use of a foreign vessel.

NL Region does not have the same procedures as Maritimes for Foreign Licensing and we do not provide advice on their processes. Please ensure that any licensing inquiries are directed to the licensing inbox for a response from a licensing officer.

FYI

Connie

Regional Manager Licensing Operations  
Maritimes Region  
Fisheries and Oceans Canada  
P.O. Box 1006, P600  
Dartmouth, NS  
B2Y 4A2  
e-mail: [licence.maritimes.permis@dfo-mpo.gc.ca](mailto:licence.maritimes.permis@dfo-mpo.gc.ca)  
fax: 902-426-5010  
Ph: 902-426-9966

---

**From:** Quinsey, Kira  
**Sent:** March-28-18 11:50 AM  
**To:** MacDonald, Jennifer; Farr, Connie  
**Subject:** RE: Clarification regarding s.52 Licence applications

Hi Jennifer,

It's my understanding that any research being undertaken will be covered by the Foreign Fishing Vessel licence. Connie, can you help clarify?

Thanks!

Kira

**From:** MacDonald, Jennifer  
**Sent:** March-28-18 11:33 AM  
**To:** Quinsey, Kira <[Kira.Quinsey@dfo-mpo.gc.ca](mailto:Kira.Quinsey@dfo-mpo.gc.ca)>  
**Subject:** Clarification regarding s.52 Licence applications

Hello Kira,

I have been working with the group OCEARCH regarding issuing a SARA permit to catch and tag White Sharks in Canadian waters. The group will be coming from the U.S. this summer to undertake this research. I had passed along the Licencing contact information, as I understood they would need both a Foreign Fishing Vessel Licence and a s. 52 Licence. I understand that they have contacted you and were told they need to apply through their state department. I was hoping you could just clarify the process for me, so that if there are other groups in the same circumstances, we can send them in the right direction. Do they apply through the state department for both the Foreign Fishing Vessel Licence and the s. 52 Licence? They are finding the process a bit confusing, because they are also seeking permits/licences from Newfoundland Region and the process there seems a bit different. Does the state department coordinate both types of licences or do they still apply directly to DFO for the s. 52 licence (which I think they will need as they will be catching the sharks in order to tag them)?

Thank you so much!

Jenn

**Jennifer MacDonald**

Species at Risk Biologist | Biologiste des espèces en péril

Species at Risk Management Division | Division de la gestion des espèces en péril

Ecosystem Management | Gestion des écosystèmes

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## MacDonald, Jennifer

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**From:** Robert Hueter <[rhueter@mote.org](mailto:rhueter@mote.org)>  
**Sent:** March-28-18 12:14 PM  
**To:** MacDonald, Jennifer; Sooley, Darrin  
**Cc:** Chris Fischer; Brandon Eyre  
**Subject:** Re: Request for license application forms

No problem, Jenn, I think we're getting closer to the answers, working with our U.S. State Dept. At least I learned all the terminology from you, thank you for that!

Bob

**ROBERT E. HUETER, Ph.D.**

*Senior Scientist & Director, Center for Shark Research  
Perry W. Gilbert Chair in Shark Research  
Manager, Sharks & Rays Conservation Research Program  
Mote Marine Laboratory  
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[rhueter@mote.org](mailto:rhueter@mote.org)  
Tel: 941-388-1827  
Fax: 941-388-4312  
More info at: [www.mote.org](http://www.mote.org)

On 3/28/2018 11:13 AM, MacDonald, Jennifer wrote:

Hi Bob,

My apologies, but it appears I had led you astray. For scientific research being conducted from a foreign vessel, the licencing process is coordinated between the Foreign Fishing Vessel Licence and the s. 52 Scientific Licence. As the Licencing office indicated below, both processes are coordinated through your state department. I apologize for any confusion.

Best regards,

Jenn

**Jennifer MacDonald**  
Species at Risk Management Division  
(902) 407-8175

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**From:** Robert Hueter [<mailto:rhueter@mote.org>]  
**Sent:** March-27-18 2:34 PM  
**To:** MacDonald, Jennifer; Sooley, Darrin  
**Cc:** Chris Fischer; Brandon Eyre  
**Subject:** Fwd: RE: Request for license application forms



Hi Jenn & Darrin:

I emailed the DFO departments in Nova Scotia and Newfoundland as you instructed about our other permit needs, and just got the reply below from Nova Scotia. This doesn't sound right to me, after all you've told us before. Can you help us understand?

Thanks,

Bob

**ROBERT E. HUETER, Ph.D.**

*Senior Scientist & Director, Center for Shark Research  
Perry W. Gilbert Chair in Shark Research  
Manager, Sharks & Rays Conservation Research Program  
Mote Marine Laboratory  
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More info at: [www.mote.org](http://www.mote.org)

----- Forwarded Message -----

**Subject:**RE: Request for license application forms

**Date:**Tue, 27 Mar 2018 16:12:33 +0000

**From:**Licence Maritimes / Permis Maritimes (DFO/MPO) <[RegionalLicensing.XMAR@dfo-mpo.gc.ca](mailto:RegionalLicensing.XMAR@dfo-mpo.gc.ca)>

**To:**Robert Hueter <[rhuetter@mote.org](mailto:rhuetter@mote.org)>

Hello Dr. Hueter,

Applications for scientific research involving foreign vessels must be submitted through your state department (commerce). Please contact them for the required paperwork.

Regards,

**Kira Quinsey**

Regional Licensing Officer | Agent de permis

Ecosystems and Fisheries Management | Gestion des écosystèmes et des pêches

Maritimes Region | Région des Maritimes

Fisheries & Oceans Canada | Pêches et Océans Canada

Tel : 902-426-6453 | Fax : 902-426-5010

[Kira.quinsey@DFO-MPO.gc.ca](mailto:Kira.quinsey@DFO-MPO.gc.ca)

**From:** Robert Hueter [<mailto:rhoeter@mote.org>]  
**Sent:** March-27-18 12:06 PM  
**To:** Licence Maritimes / Permis Maritimes (DFO/MPO) <[RegionalLicensing.XMAR@dfo-mpo.gc.ca](mailto:RegionalLicensing.XMAR@dfo-mpo.gc.ca)>;  
Experimental-Licensing / Experimental (DFO/MPO) <[Experimental.Licenses@dfo-mpo.gc.ca](mailto:Experimental.Licenses@dfo-mpo.gc.ca)>  
**Cc:** Chris Fischer <[chris@oceanarch.org](mailto:chris@oceanarch.org)>; Brandon Eyre <[brandon@oceanarch.org](mailto:brandon@oceanarch.org)>; Fernanda Ubatuba  
<[fubatuba@oceanarch.org](mailto:fubatuba@oceanarch.org)>; Bryan Franks <[REDACTED]>  
**Subject:** Request for license application forms

OCEARCH has applied for a DFO SARA permit to conduct scientific research on white sharks (*Carcharodon carcharias*) in Atlantic Canadian waters off Nova Scotia and Newfoundland, aboard our vessel the M/V OCEARCH this September 2018. We anticipate receiving the SARA permit soon. We wish to receive the current permit application forms from your office for all other licenses that are needed to conduct this research. We are told this includes a license application under Section 52 of the Fishery (General) Regulations, as well as a Foreign Fishing Vessel License.

Could you please email us as soon as possible all necessary forms for us to fill out and return for approval, so that we will be properly permitted to conduct this work in September.

Thank you for your assistance in guiding us through this process. We are happy to answer any questions at this stage.

Best regards,

Dr. Robert Hueter

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**ROBERT E. HUETER, Ph.D.**

*Chief Science Advisor, OCEARCH  
Senior Scientist & Director, Center for Shark Research  
Perry W. Gilbert Chair in Shark Research  
Manager, Sharks & Rays Conservation Research Program  
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## MacDonald, Jennifer

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**From:** MacDonald, Jennifer  
**Sent:** April-05-18 9:57 PM  
**To:** Humphrey, Donald  
**Subject:** RE: For your review: OCEARCH Permit documents

**Follow Up Flag:** Follow up  
**Flag Status:** Flagged

Thanks Donald. I'll make the changes to the assessment form. I just made a few small changes to the actual permit to incorporate your comments from the review form. The permit is saved [here](#).

I will follow up with Darrin next week to try and get things finalized from their end. We did have two outstanding points in the permit that he was seeking Science input on (the maximum length of time and the minimum size of shark) – I don't think we're considering removing them as conditions but just getting additional feedback on the values indicated. He did indicate that he wasn't comfortable sharing the draft permit with OCEARCH as we had discussed potentially doing. Would you suggest that I flag these two conditions with OCEARCH in advance of finalizing the permit?

Thanks,  
Jenn

**Jennifer MacDonald**  
Species at Risk Management Division  
(902) 407-8175

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**From:** Humphrey, Donald  
**Sent:** April-05-18 1:11 PM  
**To:** MacDonald, Jennifer  
**Subject:** RE: For your review: OCEARCH Permit documents

Hi Jenn, attached are my comments on the assessment form. Just wondering if you have updated the permit at all before I review it? The version you sent me is attached.

Also, would you be able to send me links to documents going forward? It helps me with quickly saving any edits in the same location.

Thanks, Donald

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**From:** MacDonald, Jennifer  
**Sent:** March-23-18 1:59 PM  
**To:** Humphrey, Donald  
**Subject:** RE: For your review: OCEARCH Permit documents

Hi Donald,  
Attached is a revised version of the Assessment and Approval form incorporating some of the information we discussed with OCEARCH yesterday. I've also sent this to Darrin. I've asked him to confirm if he is comfortable if we share a draft of the permit itself with OCEARCH, once you've had a chance to review it.  
Thanks,

Jenn

**Jennifer MacDonald**

Species at Risk Management Division  
(902) 407-8175

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**From:** MacDonald, Jennifer  
**Sent:** March-20-18 2:22 PM  
**To:** Humphrey, Donald  
**Subject:** For your review: OCEARCH Permit documents

Hi Donald,

Attached are the draft Assessment and Approval Form as well as the draft Permit for OCEARCH for your review.

You will see that there are a couple of items highlighted in the documents, as well as a few comments for us to discuss. These documents have both been reviewed by Aimee and by Darrin Sooley. They also reflect input from Heather and Warren, although the documents themselves have not been reviewed by Science.

We have a call with OCEARCH on Thursday afternoon. There are a few items (also highlighted in the attached), that we may want to discuss with them at that time:

- we require confirmation of the expedition leader/lead scientist to include in the documentation (while Bob Hueter has been my main point of contact and providing the information related to the application, I do not believe he is necessarily onboard for all expeditions).
- the OCEARCH Animal Care Protocol is pending approval from Jacksonville University; I don't know if we want to wait until we have a copy of that to confirm the conditions in our permit?
- OCEARCH has requested to use internally implanted acoustic tags; there can be some concerns with surgical implantation and potentially increased risks to the sharks; we may wish to discuss the use of externally attached tags.
- likewise, there is a newer methodology that only requires a single bolt for SPOT tag attachment, rather than the 4 bolt methodology that OCEARCH has proposed; there may be technical limitations due to the tags OCEARCH already has, but again, we may wish to discuss this with them.
- we are also proposing that we restrict tagging to sharks greater than 14 feet (although we may be able to consider a somewhat smaller size) to avoid tagging juveniles, for whom fin damage from SPOT tags may be greater.
- we are also proposing limiting the total time of engagement with an individual shark to somewhere between 30 and 40 minutes (from time of capture to release); OCEARCH has indicated in their application that usually within 5-10 minutes of catching a shark, they are able to guide it onto the lift and the time on the lift is limited to 20 minutes (the low end of the time range would be just allowing for the 10 minutes from capture to lift, with 20 minutes on the lift; the higher end of the time limit provides some buffer to this for the raising of the lift, etc.).

There are a few outstanding concerns that continue to be flagged:

-I have not included any conditions in the SARA permit related to the amount or type of chum to be used. In other jurisdictions, there have been limitations placed on the amount of chum that can be put in the water on a daily basis; this seemed to be primarily a public safety issue and was required where chumming would be done close to shore. OCEARCH has indicated that chum includes whale blubber and oil, mackerel/tuna and/or menhaden oil. Warren has raised concerns about the sourcing of whale material for chum (indicating they may have used right whale material in the past). OCEARCH has indicated that they will seek appropriate permit for importation and/or use of marine mammal material in Canada. As this is outside the SARA permitting process, I have not included any conditions around the type of chum in the permit, however, if marine mammal material (in the US this is sourced from dead, stranded whales, were to possibly include any SARA species, additional permitting would be required). We may wish to discuss this aspect further.

Aimee and Katie have been discussing the potential need for a communications plan to be in place either before the permit is issued or at a minimum before the research expedition takes place. Can we discuss timing of issuing the permit in relation to development of such a plan?

I have a hard copy folder of all the documents provided by OCEARCH if you want to review any other materials before the call on Thursday. Should I also set up a time for us to meet before that call to go over the attached?

Thanks,  
Jenn

**Jennifer MacDonald**

Species at Risk Biologist | Biologiste des espèces en péril  
Species at Risk Management Division | Division de la gestion des espèces en péril  
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FILE NO: DFO-MAR-2017-17  
17-PNFL-00020

**Ecosystem Management – Assessment and Approval of  
Species at Risk Act (SARA) Section 73 Permit Application**

**1. APPLICANT INFORMATION**

Permit Renewal? ☐ Yes ☒ No  
Permit Amendment? ☐ Yes ☒ No  
Is this a multi-year permit application? ☐ Yes ☒ No  
If so, what is the starting year and ending year:  
Previous Permit Number(s): n/a

**Individual(s) or Organization to appear as the Licensee on the Permit**

Name: OCEARCH  
Contact: George Christopher Fischer  
Email: chris@ocearch.org  
Address: 1790 Bonanza Drive, Suite 101B  
Park City, Utah, USA 84060  
Phone: 435-645-8990

The following individuals and those under their direct supervision may undertake the activities authorized by the permit:

Name	Organization
Robert Hueter	Mote Marine Laboratory

**2. ACTIVITIES INFORMATION**

a) **Listed Species Affected:** White Shark (*Carcharodon carcharias*), Atlantic population - Endangered

**b) Project Summary:**

OCEARCH is proposing to conduct scientific research on White Sharks in Canadian waters to provide information in relation to a number of questions, including understanding the role of coastal waters off Nova Scotia and Newfoundland in the life history of the White Shark population, the range of the White Shark population in the northwest Atlantic, the health of White Sharks inhabiting Canadian waters, and adaptations of White Sharks for northwest Atlantic waters.

OCEARCH is proposing to conduct a research expedition in Canadian waters in September/October 2018, involving a collaborative team of scientists who will be onboard and collecting data to support a number of research projects. Sharks will be caught and guided to a research platform on the M/V OCEARCH. Research procedures (sampling and tagging) will be carried out on board the vessel, following which the animals will be released live. OCEARCH has requested a permit to tag 20 sharks in Canadian waters based on their analysis that 60 sharks are required for their various research studies (20 young-of-the-year, 20 immature and 20 mature); to date OCEARCH has tagged 33 sharks in the north Atlantic.

Actively attracting White Sharks to the fishing boat and the larger research vessel will be carried out by placing chum in the water using a variety of techniques. Observers on board the vessel scan for signs of White Shark activity and OCEARCH also makes use of drones, to search for White Sharks. To attract sharks, a combination of chum bags, chum boxes, bait tanks, chum tubes and decoys are used.

The chum consists of whale blubber and oil, mackerel and tuna, and/or menhaden oil. OCEARCH will seek a marine mammal permit from DFO to authorize the use of marine mammal material in Canadian waters.

**White Sharks will be caught** from the fishing boat using a circle hook (20/0 or 27/0 with zero offset). The hooks will be rigged with a crossbar bite-blocker (30cm up the leader) to prevent the shark from swallowing the bait. The hook will be attached to stainless steel wire rope (3/32" or 1/8"); the leader is about 10m and will be attached to a braid rope with elasticity properties to reduce hard shock when the initial struggle ensues. Typically within 5-10 minutes of being caught, the White Shark is guided onto the hydraulic lift on the research vessel.

**White Sharks will be lifted out of the water** on a hydraulic lift that is lowered off the research vessel. The lift, which includes side guides and an end gate to prevent the shark from swimming off, will be lowered below the waterline and the shark guided on. The lift will then be slowly raised above the water. Once on the lift, the hook will be removed from the shark's jaw. Oxygenated seawater will be pumped through a hose and mouthpiece (allowing for simultaneous flushing of the gills on both sides of the head) into the shark's buccal cavity at all times while on the lift. The shark will be on its side for the initial 5-7 minutes (to take blood samples, implant the acoustic tag, perform ultrasound) then it is rolled to an upright position (to attach satellite tag). Other procedures undertaken while the White Shark is on the lift will be the collection of swabs (skin mucus, gill surface and cloacal swabs); collection of parasites, collection of semen, fecal, and muscle samples, as well as possibly urine samples if the animal urinates while on deck, and the collection of eye and tail measurements.

**Blood and tissue sampling** will be conducted while White Shark are onboard the vessel. A hypodermic puncture and biopsy punch will be used to obtain blood (<25ml), muscle (<5g), semen, and skin mucus samples.

**Implantation of internal acoustic tags** will be conducted by making a surgical incision to insert a sterilized transmitter (1cm x 6cm) into the coelomic cavity. The incision will be sutured and the sutures will be absorbed over a period of time. OCEARCH is proposing to insert the internal acoustic tags in every White Shark (up to 20) caught in Canadian waters under this permit application.

**Attachment of satellite tags** will be conducted by drilling and bolting Smart Position or Temperature (SPOT) tags on the leading edge of the first dorsal fin. The SPOT tags (Wildlife Computers Model SPOT-257) measure 162 x 57 x 20 mm and weigh 160 g. To attach the tag, four holes are drilled in the dorsal fin with an electric drill (drill bit will be cleaned and sterilized in alcohol before use). The tag will be attached with alcohol-sterilized nylon bolts, stainless locknuts and plastic spacers (standard hardware from the tag manufacturer). Tags will be coated with an antifouling compound. The hardware is designed to retain the tag for five years, after which it will fail and the tag will detach. OCEARCH is proposing to attach a SPOT tag to every White Shark (up to 20) caught in Canadian waters under this permit application.

Pop-up Satellite Archival Tags (PSAT) will be attached via a tether to a subdermal metal dart implanted in the shark's flank below the first dorsal fin. PSAT tags are provided to OCEARCH by a collaborator at the Woods Hole Oceanographic Institution. The number of tags has not been confirmed, but will likely be 4-6 tags. The PSAT tags will be attached, in addition to acoustic and SPOT tags, on 4-6 White Sharks.

OCEARCH is also potentially looking to use a prototype tag that is a combination of a PSAT and SPOT tag. The tag is attached via a darted tether in the same way as a PSAT tag. If these new prototype tags are available, they will be used instead of the PSAT tag on 4-6 White Sharks. As these are prototype tags, OCEARCH is proposing to use these tags in combination with the SPOT tags to validate the new tag's geolocation data.

**c) Analysis of Proposed Activities:**

<b>Location:</b> Atlantic Ocean				
Coastal Nova Scotia:				
<ul style="list-style-type: none"> <li>• Mahone Bay (44° 29.50' N / 64° 13.50' W and adjacent areas</li> <li>• Bay of Fundy (44° 54.00' N / 66° 32.50' W and adjacent areas</li> </ul>				
South Coast of Newfoundland:				
<ul style="list-style-type: none"> <li>• Placentia Bay (47° 05.00' N / 54° 32.00' W</li> </ul>				
Sable Island (43° 56.14' N / 59° 56.59' W)				
<b>Dates:</b> September 18-October 11, 2018				
Proposed Activity	Planned Effects/Outcome		Potential Incidental Effects/Outcome	
	Prohibitions that Apply	Likelihood of the prohibited impact(s)	Prohibitions that Apply	Likelihood of the prohibited impact(s)
Actively attracting White Sharks to a vessel (i.e. chumming)	Harass	Med	Harm Kill	Low Low
Capture of White Sharks	Harass Harm Capture	High Low High	Kill	Low
Lifting White Sharks out of the water	Harass Harm Capture	High Low High	Kill	Low
Blood and tissue sampling	Harass Harm Possess	Med Low High	Harm	Low
Implantation of internal acoustic tags	Harass Harm	Med Low	Kill	Low
Attachment of satellite tags – SPOT tags	Harass Harm	Med Low	Kill	Low
Attachment of satellite tags – PSAT tags	Harass Harm	Med Low	Kill	Low

Impacts to individual White Sharks would result from any distress associated with the approaching vessel, being caught and brought onboard the vessel and out of the water, the application of the different tag types and the collection of biological samples.

**Actively attracting White Sharks to a vessel (i.e., chumming)**

A number of studies suggest that the presence of chum may be linked to modification of White Sharks' normal swimming and/or hunting behaviours, although the effects are likely short term when chum is used for short term research projects.<sup>1</sup> It is possible that attracting a White Shark will cause the individual to stray from patrolling for food or from mating. Disturbance to normal feeding behaviours may result in energetic costs.<sup>2</sup>

There is a possibility that attracting sharks to the fishing boat or the research vessel may result in collisions between the shark and the vessel and that the presence of the vessel may cause behavioural changes.

<sup>1</sup> NOAA. 2014. Draft Programmatic Environmental Assessment of Potential White Shark Research and Education Projects within the Gulf of the Farallones and Monterey Bay National Marine Sanctuaries. [https://nrmssanctuaries.blob.core.windows.net/sanctuaries-prod/media/archive/library/pdfs/gfrms\\_draft\\_white\\_shark.pdf](https://nrmssanctuaries.blob.core.windows.net/sanctuaries-prod/media/archive/library/pdfs/gfrms_draft_white_shark.pdf)

<sup>2</sup> Semmens, J.M., Payne, N.L., Huveneers, C., Sims, D.W. & Bruce, B.D. 2013. Feeding requirements of White Sharks may be higher than originally thought. Sci. Rep. 3, 1471; DOI:10.1038/srep01471 (2013).



### **Catch of White Sharks**

Catch and release fishing is a source of stress to White Sharks due to the potential for long fight times (exhausting the individuals) and injury from wounds caused by the hooks. Long capture times have been known to kill bony fish and other sharks.<sup>3</sup> Physiological disruptions to fish result from the high anaerobic activity, muscle fatigue and time spent out of water caused by capture using most fishing techniques.<sup>4</sup>

Injury can result from the wound caused by the hook, although the extent of the tissue damage or injury will depend on the location of the hook and the type of gear. Sub-lethal injury can result from removing hooks or leaving them in place in the throat, esophagus or gut. In the short term, a hook in the mouth will cause a loss of blood, but the wound would be expected to heal within a year or less. Circle hooks are known to cause lower incidences of internal injury than conventional J hooks.<sup>5</sup>

Although not specific to White Shark, a study in Australia examined post release survival in Shortfin Mako by attracting individuals to a boat using chum, then using monofilament line and either J hooks or circle hooks to catch the sharks. The study showed that the length of the fight time did not impact survival. Circle hooks significantly reduced foul hooking. The study showed that hook choice affected the likelihood of mortality, while the species' is able to cope with long fight times and associated physiological responses to capture due to its endothermy and high aerobic scope.<sup>6</sup>

It has been suggested that sharks, in general, are capable of recovery from physiological stress associated with capture and that any mortality is more likely linked to the extent of any physical injuries.<sup>7</sup>

### **Lifting White Sharks out of the water**

The research platform is raised and the White Sharks are lifted from their natural, in-water environment. This removal from the water likely results in physiological stress and possible oxygen deprivation.

Lifting White Sharks out of the water, onto a hard raised platform, may create excessive pressure on tissues and organs that usually do not bear weight. This impact may be greater in larger individuals.

While there are concerns about damage to internal organs, there is no evidence reported of internal organs being crushed when sharks are removed from the water.<sup>8</sup> However, if sharks are thrashing on the deck, this could lead to internal injuries.

OCEARCH has taken blood samples in the first minute and the last minute on the lift for 120 White Sharks handled in this manner and found stress levels remain relatively low throughout the handling time. Higher amounts of stress due to capture were shown in very young White Sharks (however OCEARCH is not proposing to catch young sharks in Canadian waters).

### **Blood and tissue sampling**

The *Canadian Council on Animal Care Guidelines on Care and Use of Fish in Research* suggest that blood samples be up to 1ml/kg body size. The volume proposed to be collected by this project is well under this recommended amount.

The retention of the blood and tissue samples involves possession of parts of individuals.

### **Implantation of internal acoustic tags**

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<sup>3</sup> NOAA 2014

<sup>4</sup> Skomal, G.B. 2007. Evaluating the physiological and physical consequences of capture on post-release survivorship in large pelagic fishes. *Fisheries Management and Ecology*. 14: 81-89.

<sup>5</sup> NOAA 2014

<sup>6</sup> French R.P., Lytle J., Tracey S., Currie S., Semmens J.M. 2015. High survivorship after catch-and-release fishing suggests physiological resilience in the endothermic shortfin mako shark (*Isurus paucus*). *Conserv Physiol* 3. doi:10.1093/conphys/cov044.

<sup>7</sup> Skomal 2007

<sup>8</sup> NOAA 2014

Implanting internal acoustic tags requires making a surgical incision, from which there could be a risk of infection or causing harm to the individual.

#### **Attachment of satellite tags (SPOT and PSAT)**

In terms of physical injury associated with the tagging, shark species in general are very resilient to superficial cuts and have a tremendous capacity to heal from injury.<sup>9</sup> Similar and much more extensive lacerations occur frequently during mating behaviours, and one of the identifying characteristics of a mature female shark is deep scarring along her dorsal musculature. The tagging site is expected to close over very quickly with minimal effect on the animal, as has been observed in other species held in captivity after tagging.

Various studies have examined possible longer term effects of electronic tags or data loggers on the swimming efficiency of sharks, but results have been variable.<sup>10</sup> There may be a marginally increased drag while swimming due to the external tag.

A study from South Africa suggests that SPOT tags can cause permanent cosmetic and structural damage to the dorsal fins of White Sharks, depending on how long the tag is attached for. Tags that detach within 12-24 months did not seem to cause long term damage; while after 24 months permanent damage to the dorsal fin was reported. However, the study did not show that the damage to the dorsal fin resulted in impacts to long term survival or body growth.<sup>11</sup>

Research from Monterey Bay Aquarium also showed that real-time satellite tags attached with multiple bolts on juvenile White Sharks affects the growth of the dorsal fin (growing around the tag or causing a deflection to the tip of the fin). They suggested that there may be more of a reaction to the presence of the bolts and tag in growing tissue.<sup>12</sup>

OCEARCH has provided photographs of White Sharks observed years after tagging that show that the fins have healed and are functioning properly.

#### **Post Release Behaviour and Longer Term Effects**

Results from research in which White Sharks were caught and restrained using an in-water stretcher and then tagged, has shown a six to 48-hour recovery period for individuals after capture and tagging.<sup>13</sup>

Post-release behavioural studies by OCEARCH collaborating scientists using accelerometers attached to the sharks have shown recovery and resumption of natural swimming behaviour within approximately 6 hours after release.

Research conducted off the west coast of California that involved tagging 21 White Sharks (2007-2012), found that they resumed 'normal' behaviours after tagging, as determined by their migration patterns. These sharks were tagged with SPOT tags (using various methodology including being lifted onto a platform out of the water and being tagged while alongside the research boat).<sup>14</sup>

It has been suggested that catch and release of marine pelagic fish may have sublethal population level effects due to reduced individual fitness. However, as these population level effects are difficult to assess in highly migratory species with poorly understood life histories, this has not been quantified or studied in depth.<sup>15</sup>

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<sup>9</sup> NOAA 2014

<sup>10</sup> Hammerslag, N., 2011. A review of shark satellite tagging studies. J. Exp. Mar. Biol. Ecol. doi:10.1016/j.jembe.2010.12.012

<sup>11</sup> Jewell O J D., Weisel M.A., Gennari E., Towner A.V., Bester M.N. 2011. Effects of Smart Position Only (SPOT) Tag Deployment on White Sharks *Carcharodon carcharias* in South Africa. PLoS ONE 6(11): e27242. doi:10.1371/journal.pone.0027242

<sup>12</sup> NOAA 2014

<sup>13</sup> NOAA 2014

<sup>14</sup> NOAA 2014

<sup>15</sup> Skomal 2007

As little is known about White Shark mating behaviour, it is unknown whether tagging could have an impact on mating.<sup>16</sup>

There is anecdotal evidence of at least one White Shark having died following interactions with OCEARCH using the methods proposed here.

#### Summary

Based on the above assessment, the following activities have the potential to contravene the SARA prohibitions and therefore must be authorized under SARA:

- Actively attracting White Sharks to a vessel;
- Catching White Sharks and lifting individuals out of the water on a hydraulic lift;
- Collecting biological samples from White Sharks;
- Implanting internal acoustic tags; and
- Attaching SPOT and PSAT tags to White Sharks.

Commented [DH1]: Should add capture and release.

The effects that these activities may cause to White Sharks include:

- Capture and harassment of, and potentially harm to, individuals,
- Possession of samples from individuals, and
- Although unlikely, killing of, individuals.

The Species at Risk Management Division has concluded that the activities associated with the above project are likely to affect the **White Shark, Atlantic population**, in a manner that is prohibited by SARA, and therefore a SARA Section 73 permit is considered necessary to engage in the proposed activities.

### 3. REGULATORY ASSESSMENT OF APPLICATION

#### Necessity Assessment

Work through the following five questions to determine the appropriate action for DFO to take in response to the permit application.

1. Is it likely that one or more species listed on Schedule 1 of the SARA occurs at any of the locations identified for the proposed activities?

☒ Yes ..... Go to next question  
☐ No .....

A SARA permit is not necessary. The applicant will be informed in writing and advised to ensure any other required authorizations are obtained before proceeding with the activities. Go to Assessment Summary.

2. Are any of the SARA-listed species concerned considered an "Aquatic Species" as per the definition in the *Fisheries Act*?

☒ Yes ..... Go to next question  
☐ No .....

The applicant will be directed to resubmit the application to the appropriate agency. Go to Assessment Summary.

3. Are the locations at which any of the activities are proposed to take place under the jurisdiction of Fisheries and Oceans Canada?

☒ Yes ..... Go to next question  
☐ No .....

<sup>16</sup> NOAA 2014

The applicant will be directed to resubmit application to the appropriate agency. Go to Assessment Summary.

4. Is it certain or likely that performing any of the proposed activities will affect the SARA-listed species concerned in a way to contravene the general prohibitions of SARA (subsections 32(1), 32(2), section 33, subsections 36(1), 58(1), 60(1) and 61(1))?

☒ Yes ..... Go to next question  
☐ No .....

A SARA permit is not necessary. The applicant will be advised of this in writing. Go to Assessment Summary.

5. Do any of the exceptions listed in SARA Section 83 apply to the proposed activities concerned?

☐ Yes .....  
A SARA permit is not necessary. The applicant will be advised of this in writing and the basis on which an exception applies will be described here. Go to Assessment Summary.

☒ No .....  
A SARA Section 73 permit is required to avoid contravention of the prohibitions of SARA. DFO will proceed with the application to assess eligibility. Go to Eligibility Assessment.

**Commented [JM2]:** s. 83(5d): Subsection 32(2) does not apply to a person who possesses an individual of a listed species or any part of an individual if the person acquired it by succession from someone who was entitled to possess it under this Act.

-other review forms have listed all those that will receive/possess samples

#### Eligibility Assessment

The following two questions assess whether the proposed activities are eligible for a SARA Section 73 permit.

1. Section 73(2): The purpose of the proposed activities is described by **one or more** of the following:

- ☒ The activity is scientific research relating to the conservation of SARA-listed species and will be conducted by qualified persons
- ☐ The activity benefits the species or is required to enhance its chance of survival in the wild.
- ☐ Affecting the SARA-listed species is incidental to carrying out the activity

The proposed activities aim to answer a number of research questions, both through the tracking of individual White Sharks that will be tagged and through analysis on blood and other tissue samples.

The draft Recovery Strategy for White Shark identifies the following as high priority research and management approaches:

- undertake scientific research to better understand population dynamics, distribution and habitat use.
- collect and maintain White Shark sightings information; maintain this information in a database and share via network

OCEARCH's Chief Science Advisor is Dr. Robert Hueter. He is the Director of the Center for Shark Research at the Mote Marine Laboratory and has more than 25 years experience in shark research.

☒ Yes ..... Go to next question

☐ No .....  
The proposed activities are not eligible for a SARA Section 73 Permit. Go to Assessment Summary.

2. Section 73(3): The proposed activities meet **all** of the following pre-conditions:

- ☒ All reasonable alternatives to the activity that would reduce the impact on the species have been considered and the best solution has been adopted

In the consideration of alternatives to the proposed research, there are a number of alternatives that should be considered. The first alternative to consider would be to not undertake the activity and not conduct the research; however, given the many unknowns about the species this would not represent the best solution as it would be a loss of an opportunity to learn more.

There are no alternative locations to conduct the research, as it must be conducted within the range of the species.

In relation to the proposed activities, overall the applicant asserts that the methods and procedures proposed are the safest and most successful way of obtaining the necessary samples and attaching SPOT tags.

#### Attracting and Catching White Shark

- The alternative to chumming for White Shark is to not use chum, which would limit the ability to sight White Sharks to passive observations. Given the low numbers in a large area, chance encounters would be low, which would reduce or even eliminate the success rate of researchers attempting to deploy tags or obtain samples.

#### Catching, restraining and lifting the shark out of the water

- Alternative approaches include (1) attracting a shark and sampling/tagging it without restraining or catching it and (2) attracting a shark and catching it, but conducting sampling/attaching tags while the shark remains in the water.
- The following summarizes the type of tagging and sampling that is possible under each alternative:

	(1) No Capture	(2) Capture and Tag in Water	(3) Capture and Use of Lift
<b>Tag Types</b>	PSAT Acoustic (external)	SPOT PSAT Acoustic (external)	SPOT PSAT Acoustic (internal or external)
<b>Other Samples</b>	-- muscle samples	-- blood samples -- swabs (skin mucus) -- muscle samples	-- blood samples -- swabs (skin mucus, gill surface and cloacal swabs) -- muscle samples -- parasite samples -- semen samples -- fecal samples -- urine samples (opportunistic) -- eye/tail measurements -- ultrasound

- Under alternative (1), the success rate for tagging and collecting samples would likely be less than using one of the alternative methodologies, which involve catching the sharks. This approach can also require chasing the individuals with a small to mid-sized boat, which can increase stress levels. There is a risk with this approach that tags would not be attached properly.
- Under alternative (2), some researchers have suggested that keeping the shark in the water reduces the stress experienced by the shark as a result of being lifted from the water. However, OCEARCH has indicated that sharks are more likely to struggle if they remain in the water, while being on the lift quiets the animals and therefore they conclude that the proposed method reduces the potential for harm to the sharks. Sampling and tagging using an alongside-boat method requires calm sea conditions, which are often not encountered. Working alongside a boat with a large animal that is likely to be struggling also increases the risk to researchers.
- With respect to the precise methodology proposed to capture sharks, the approaches proposed

likely present the best alternative to reduce potential impacts. Alternatives would be to use a 'J' hook instead of a circle hook, to not use the bite blocker, to not embed the leaders in rope. However, all of these alternatives would increase the risk of internal (e.g., gut-hooking) or external (e.g., lacerations) injury to the sharks.

#### Blood and tissue sampling

- An alternative method to collecting biological samples, would be collect samples by harpoon, while the shark remains in the water. However, the collection of blood samples, swabs of the skin mucus, gill surface and cloacal, parasite collection and semen samples require catching and controlling the animal. Further, attempting to obtain samples in the water increases the risk of sample contamination, loss of sample and infections in the shark. Muscle samples are taken from the site of the PSAT tag attachment reducing sample wounds on the shark.

#### Tagging

- SPOT, PSAT and acoustic tags all collect different types of data:
  - SPOT tags transmit location and other data in real time. Information is transmitted while the tag is attached to the shark; the data signal from these tags is sent when the shark's dorsal fin is at the surface. SPOT tags may transmit data for up to 3-5 years. To obtain real-time geolocation data from an animal that is wide ranging within areas that are previously unknown, SPOT tags provide the best option for collecting this data.
  - Data from PSAT tags is stored on the device and retrieved after the tag detaches from the shark. PSAT tags will collect data for approximately one year. PSAT tags provide archived temperature and depth data, but the geolocation data is less precise and not available in real-time.
  - Acoustic tags are useful to detect the arrival of an animal in an area where underwater acoustic receivers have been deployed (typically well-studied inshore areas). These tags provide fine-scale geolocation data, but only in areas where there are acoustic receivers.
- OCEARCH has indicated that to understand an animal's large scale movements and migration, SPOT tags are the most effective in revealing the precise tracks and this data, in their perspective, cannot be substituted with data from PSAT or acoustic tags. Further, the real time data from SPOT tags support their educational and outreach objectives.
- There are alternative attachment methodologies for tags:
  - Acoustic tags can be attached externally rather than internally. While some researchers have successfully utilized externally attached acoustic tags, OCEARCH has indicated that there are concerns with the risk that external tags can be shed. In addition, internal tags have been shown to transmit for up to 5 years (and even up to 10 years), while external tags have a shorter lifespan of approximately 1 year. OCEARCH has further indicated that the internal tags do not cause on-going harm to sharks once implanted.
  - SPOT tags can also be attached as floating tags, however OCEARCH indicated concern that floating SPOT tags can be fouled, shed and lost from the animal very rapidly.
  - Other researchers have developed a technique to attach SPOT tags with a single bolt, rather than the four bolt attachment methodology proposed by OCEARCH. OCEARCH has indicated that their information indicates that the single bolt attachment has a shorter lifespan, limiting the data that can be collected. Additionally, the single bolt attachment requires a saddle in which the tag is placed when attached; this saddle may decrease hydrodynamics for the sharks on an on-going basis.

- ☒ All feasible measures will be taken to minimize the impact of the activity on the species or its critical habitat or the residence of its individuals

The following measures were proposed by OCEARCH to minimize the impacts of the activities:

- individuals will not be chased by the vessel, but will be attracted using chum;
- gear will be used that will minimize the chance that animals are gut-hooked (including using circle hooks and a crossbar bite-blocker);
- animal struggles and injury will be minimized by:

- using a leader attached to a braid rope with elasticity properties to help reduce hard shock during the initial struggle;
  - using a 10m leader length in case the shark rolls in the line to ensure that the shark cannot bite through the rope and escape (retaining the hook and leader);
  - embedding the leader inside a three-strand rope to give it a thicker diameter so that if the shark rolls, the thicker rope does not cut into the sharks' skin and is easier to unwrap;
  - using heavier tackle that keeps enough pressure on the shark so that the line is stretched tight and the shark cannot turn and roll.
- all research procedures will be conducted within 20 minutes;
- while on the research platform:
  - oxygenated seawater will be pumped through a hose and mouthpiece (allowing for simultaneous flushing of the gills on both sides of the head) into the shark's buccal cavity at all times;
  - a tail rope will be used to prevent the animal from causing harm to itself and others;
  - the head and eyes will be covered with wet terrycloth towel to reduce stress and keep eyes moist;
  - skin will be kept wet during in-air procedures to prevent drying;
  - animal stress will be monitored by observing skin colouration, presence of blood pooling, gill movements, and animal activity:
    - if stress is detected in the animal, a blood sample will be taken to evaluate the shark's conditions;
    - if acute stress is observed, the animal will be released immediately.
- OCEARCH is currently seeking approval of their animal care plan from Jacksonville University and will notify DFO once that the approved plan is in place.

In addition, the permit will require that:

- the total time of engagement with a single White Shark be limited to 40 minutes (from the time it is initially hooked until it is released);
- a maximum number of 20 White Sharks can be tagged;
- as the impact on fin development of attaching SPOT tags has been shown to be greater in juvenile sharks<sup>17</sup>, only White Sharks greater than 14 feet in total length can be caught and tagged;
- a DFO Scientist or Observer must be onboard throughout the duration of the expedition;
- work will cease and DFO will be contacted immediately if there is any mortality of a White Shark or if a White Shark receives any significant injury and no further attempts at catching or tagging White Sharks will be resumed until approved by DFO;
- all interactions with White Sharks (including location of capture/tagging events; number and gender/age of all White Sharks caught and tagged) and all mitigation measures employed will be reported to DFO. In addition, unsuccessful tagging attempts, in which White Sharks were observed but not caught or tagged, will also be reported to DFO (location, length estimate, gender (if visible), weight).

**Commented [DH3]:** I don't know if this will be realistic throughout the entire expedition so we may not want to add a qualifier in the permit (E.g., observer during a subset of the trips TBD).

☒ The activity will not jeopardize the survival or recovery of the species

Tagging of White Sharks is unlikely to jeopardize the survival or recovery of the population. The recovery goal in the draft recovery strategy is to: "Maintain or increase the population of White Sharks that frequent Atlantic Canadian waters." No mortality is expected as a result of the activities, and therefore recovery will not be compromised. Even in the very unlikely event that mortality occurs during the activities, Science advice indicates that the population of White Sharks in the NW Atlantic is increasing and current mortality levels (due to incidental capture in fisheries) would have to increase substantially before population trajectories would be predicted to decline. Therefore there is a high likelihood that

<sup>17</sup> Jewell et al. 2011

recovery goals can be achieved under various scenarios of allowable harm for White Shark, even if annual bycatch mortality increases from historical estimates.<sup>18</sup>

☒ Yes ..... **Go to Consultation Assessment**

☐ No .....  
**The proposed activities are not eligible for a SARA Section 73 Permit. Go to Assessment Summary.**

#### **Consultation Assessment**

The following two questions assess whether consultation with an outside party is required before issuing a SARA Section 73 Permit for the proposed activities:

1. **Section 73(4):** Do the proposed activities concern a species in an area in respect of which a wildlife management board is authorized by a land claims agreement to perform functions in respect of wildlife species?

☐ Yes ..... **Go to Assessment Summary**  
☒ No ..... **Go to next question**

2. **Section 74(5):** Do the proposed activities concern a species in a reserve or any other lands that are set apart for the use and benefit of a band under the Indian Act?

☐ Yes ..... **Go to Assessment Summary**  
☒ No ..... **Go to Assessment Summary**

#### **Assessment Summary**

The above assessment is summarized below. In order to recommend that a SARA Section 73 Permit be issued for the proposed activities, the above assessment must demonstrate that doing so is warranted, lawful, and if applicable, that all consultation requirements of SARA s. 73(4) or 73(5) have been fulfilled.

1. The proposed activities warrant the need for a SARA Section 73 Permit.

☒ Yes ..... **Go to next question**  
☐ No .....

**A SARA permit is not necessary. The applicant will be advised of this in writing. Go to EM Permit Decision.**

2. The proposed activities are consistent with all of the eligibility requirements of SARA Section 73.

☒ Yes ..... **Go to next question**  
☐ No .....

**The proposed activities are not eligible for a SARA s.73 Permit. Go to EM Permit Decision.**

3. The permit decision, proposed activities, and any permit contents require consultation with an outside party.

☐ Yes .....  
**Undergo consultation with the appropriate party before proceeding further in the permitting process.**

☒ No .....  
**Issue a SARA s.73 Permit. Go to Ecosystem Management Permit Decision.**

<sup>18</sup> pFO. 2017. Evaluation of Scope for Harm for White Shark (*Carcharodon carcharias*) in Atlantic Canada. DFO Can. Sci. Advis. Sec. Sci. Resp. 2017/025.



#### 4. REVIEW

Input sought from:

Name	DFO Sector
Aimee Gromack	DFO Maritimes - SARMD
Heather Bowlby / Warren Joyce	DFO Maritimes - Science

#### 5. ECOSYSTEM MANAGEMENT PERMIT DECISION

☐ A SARA Section 73 Permit is not considered necessary to engage in the proposed activities.

☒ Issue SARA Section 73 Permit subject to the conditions outlined in the SARA Section 73 Permit for DFO-MAR-2017-17.

☐ Do not issue Section 73 Permit.

#### 6. SIGN-OFF

Reviewed by:

\_\_\_\_\_  
Donald Humphrey  
Regional Manager  
Species at Risk Management Division (Maritimes  
Region)

\_\_\_\_\_  
Date

\_\_\_\_\_  
Darrin Sooley  
Acting Regional Manager  
Species at Risk Management Division (Newfoundland  
and Labrador Region)

\_\_\_\_\_  
Date



Fisheries and Oceans  
Canada

Pêches et Océans  
Canada

SARA Permit No: DFO-MAR-2017-17

## PERMIT ISSUED UNDER SECTION 73 OF THE *SPECIES AT RISK ACT*

Subject to the conditions described in this permit, the holder of this permit ("Permit Holder"), or any qualified person acting under the authority of the Permit Holder, is authorized under the authority of subsection 73(1) of the *Species at Risk Act*, S.C. 2002. c.29 (SARA) to engage in activities (as described in this permit) that **harm, harass, capture, and possess** individuals of the following threatened or endangered aquatic species listed on Schedule 1 of SARA:

**White Shark** (*Carcharodon carcharias*), Atlantic population

### Permit issued to:

Name: OCEARCH ("Permit Holder"):  
Attention to: George Christopher Fischer  
Address: 1790 Bonanza Drive, Suite 101B  
Park City, Utah, USA 84060  
Email: [chris@oceanarch.org](mailto:chris@oceanarch.org)  
Phone: (435) 645-8990 (office) [redacted] (cellular)

The following individual operating under the authority of Fisheries and Oceans Canada (DFO) as "Permit Holder", and those under his supervision, may undertake the activities authorized by this permit:

Name	Organization
Robert Hueter	Mote Marine Laboratory

### Location of Proposed Activity

**This permit is only valid at the following location(s):**

Nearest community (city, town, village): N/A

Municipality, district, township, county: N/A

Province: N/A

Name of watercourse(s), waterbody(ies): **Atlantic Ocean**

Specific location: Mahone Bay, Bay of Fundy and the area around Sable Island

### Valid Permit Period

This permit is valid from [redacted] until **November 30, 2018**

If the Permit Holder cannot complete the activity during this period, Fisheries and Oceans Canada (DFO) must be notified in advance of the expiration of the time period, as soon as the Permit Holder is aware.

The period during which other conditions of this permit must be complied with are provided in their respective sections below. DFO may, where appropriate, amend this permit. In cases where the Valid Permit Period is extended, written notice and/or an amended permit will be provided to the Permit Holder.

Canada

.../2

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### Description of the Activity

The purpose of the activity is to conduct scientific research on White Sharks in Canadian waters to gain a better understanding of the role of Canadian waters in the life history of the White Shark population in the northwest Atlantic Ocean, the range of the species within Canadian waters and health of White Sharks. The researchers will attach acoustic and satellite tags, as well as collect various biological samples, from up to 20 sharks in Canadian waters.

The study area includes:

- Mahone Bay (44° 29.50' N / 64° 13.50' W and adjacent areas;
- Bay of Fundy (44° 54.00' N / 66° 32.50' W and adjacent areas; and
- Sable Island (43° 56.14' N / 59° 56.59' W).

Researchers will use chum to attract White Sharks in the study area to the fishing boat and larger research vessel. When a White Shark is sighted, either visually or using a drone, the fishing boat will target its fishing activities to attract and capture that shark. Chum bags, chum boxes, bait tanks, chum tubes and decoys may all be used to attract White Sharks to the fishing vessel. Once a White Shark is in the vicinity of the fishing vessel, the researchers will attempt to catch the shark using a 20/0 circle hook (zero offset) with a bite-blocker attached. In the case of a very large White Shark, a 27/0 circle hook (zero offset) with a buoy to prevent swallowing of the hook will be used. Once caught, the White Shark will be guided onboard the hydraulic lift on the research vessel, which will then be raised above the waterline. While on the lift, sharks will be provided with oxygenated seawater via a mouthpiece and tube.

Once on the lift, internal acoustic tags will be implanted surgically in the coelomic cavity and the incision will be sutured. Smart Position and Temperature (SPOT) tags will be attached on the leading edge of the first dorsal fin by drilling four holes in the dorsal fin with an electric drill and attaching the tag with nylon bolts, stainless steel locknuts and plastic spacers. The hardware is designed to retain the tag for five years after which it will fail and the tag will detach. All White Sharks caught, up to 20, will have both acoustic and SPOT tags applied. Pop-up Archival Satellite Tags (PSAT) will be attached via a tether to a subdermal metal dart implanted in the shark's flank below the first dorsal fin. PSAT tags will be attached to up to 6 White Sharks caught.

The researchers will also collect samples (blood, muscle, semen, fecal and urine samples), conduct skin, gill and cloacal swabs, collect parasites, collect eye and tail measurements, and perform an ultrasound (females). Samples will be collected using a hypodermic puncture and biopsy punch.

The activities authorized by this permit consist of:

- Actively attracting White Sharks to a vessel;
- Catch and release of White Sharks and lifting individuals out of the water on a hydraulic lift;
- Collecting blood and tissue samples;
- Implanting internal acoustic tags; and
- Attaching SPOT and PSAT tags.

**Commented [DH1]:** Not sure if this is needed as it is part of how they are caught or whether it should be a separated bullet.

The effects that the activity may cause to the listed wildlife species and the effects of those changes authorized by this permit are as follows:

- Harm, harassment, capture and possession of listed aquatic species at risk.

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**Terms and Conditions of Permit**

The activity must be carried on in accordance with the following conditions:

**1. General Conditions**

- 1.1. A copy of this permit shall be kept on site at all times in the possession of the Permit Holder or a person acting under the Permit Holder's authority, and shall be made available to an enforcement officer upon request.
- 1.2. All persons undertaking the activity under the authority of the Permit Holder shall do so under the direction and oversight of the Permit Holder and shall be made familiar with the conditions of this permit.
- 1.3. The activity must comply with the conditions identified within this permit. Activities that affect individuals of species at risk, their residences, or their critical habitat, other than those specifically identified within this permit are not authorized under this permit.
- 1.4. No changes to the Permitted activities shall take place without prior consultation with DFO, and written approval from DFO, Species at Risk Management Division. Contact information as follows:

**Species at Risk Management Division**  
**Fisheries and Oceans Canada**  
**P.O. Box 1006**  
**Dartmouth, NS, B2Y 4A2**  
**email: [SpeciesatRisk.xmar@dfo-mpo.gc.ca](mailto:SpeciesatRisk.xmar@dfo-mpo.gc.ca)**  
**phone: 1-866-891-0771 fax: 1-902-426-2331**

Commented [DH2]: is this our regional number?

**2. Conditions to avoid or minimize the impact of the activity on the species:**

- 2.1. To the extent possible, activities shall be conducted in a manner whereby any individuals of the species shall be handled only in the circumstances authorized under this permit and with the least amount of harm.
- 2.2. Activities shall only be conducted in the study area described above. If activities are to be conducted outside the study area, DFO shall be notified in advance using the contact information in condition 1.4.
- 2.3. Only individuals that are experienced in tagging large pelagic fishes shall tag White Sharks.
- 2.4. White Sharks shall not be chased by the vessel.
- 2.5. The following gear shall be used: circle hooks (either 20/0 or 27/0 with zero offset) rigged with a cross bar bit-blocker (30cm up the leader) and attached to a stainless steel wire rope (3/32" or 1/8"). The leader shall be 10m in length and shall be attached to a braid rope with elasticity properties. Leaders shall be embedded inside a three-strand rope to increase the diameter.
- 2.6. Individual White Sharks shall not be kept on the research platform for longer than 20 minutes.
- 2.7. While on the research platform, oxygenated seawater shall be pumped through a hose and mouthpiece into the shark's buccal cavity at all times.
- 2.8. While on the research platform, a tail rope shall be used to prevent the animal from causing harm to itself and others.
- 2.9. While on the research platform, the animal's head and eyes shall be covered with wet terry cloth towel to reduce animal stress and keep eyes moist.
- 2.10. While on the research platform, the animal's skin shall be kept wet.
- 2.11. While on the research platform animal stress shall be monitored by observing skin colouration, presence of blood pooling, gill movements, and animal activity. If acute stress is observed, the animal shall be released immediately.
- 2.12. The total time of engagement with a single White Shark from the time it is initially hooked until it is released shall be limited to 40 minutes.
- 2.13. No more than 20 White Sharks, in total, shall be tagged.
- 2.14. No attempts shall be made to tag White Sharks that are injured or behaving abnormally.
- 2.15. Only White Sharks greater than 3.5 metres in total length shall be caught and tagged.
- 2.16. A DFO representative shall be onboard as an observer during a subset of the expedition to be determined by DFO.

Commented [DFO4]: Note 2.4 to 2.11 are all related to the mitigations identified by OCEARCH themselves. Items 2.12 to 2.17 are additional mitigations req'd by DFO.

Commented [DH5]: Formatting needs to be fixed.

- 2.17. In the event of a mortality or significant injury being sustained by a White Shark during a tagging attempt, all further attempts at tagging shall cease and DFO shall be contacted immediately using the contact information in condition 1.4. No further attempts at catching or tagging White Sharks shall be resumed until approved by DFO.

**3. Conditions that relate to monitoring and reporting:**

- 3.1. By December 31<sup>st</sup>, 2018, irrespective of whether the Permitted activities took place, a SARA Section 73 Permit Report shall be completed and returned to the Species at Risk Management Division using the contact information provided in condition 1.4. Without limiting the generality of the foregoing, the report shall contain the following information, to the satisfaction of DFO in its sole discretion:
- 3.1.1. to demonstrate that measures and standards to avoid and mitigate the impacts of the permitted activities on the species were implemented according to the conditions of this permit;
  - 3.1.2. an assessment of whether the measures and standards mentioned in condition 3.1.1 were successful at avoiding and mitigating the impacts of the permitted activities on the species;
  - 3.1.3. details of any contingency measures that were followed to prevent impacts greater than those authorized by this permit;
  - 3.1.4. for any interaction with, or sighting of, a White Shark, report the following: date, time, location, length, size, gender (specify if females are pregnant or not), condition of the individual; and identify if tagging was attempted or undertaken on that individual; and
  - 3.1.5. provide details of any tagging attempts, including whether tagging was successful, unplanned or unexpected impacts on the shark, reaction of the shark to the tagging, and lessons learned.

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**Authorization Limitations and Application Conditions**

This permit cannot be transferred or assigned to another party. If the activity authorized under this permit is sold or transferred to another party, or if other circumstances arise that result in another party taking over the activity, the Permit Holder shall advise DFO in advance if the ownership or responsibility for the activity is expected to change.

The failure to comply with any condition of this permit is an offence under section 97 of SARA and might result in charges being laid under SARA.

This permit may be revoked or amended to ensure the survival or recovery of White Shark. Without limiting the generality of the foregoing, DFO may:

- suspend any permitted activities to avoid or mitigate additional adverse direct or indirect effects to White Sharks;
- amend or revoke this permit; and
- direct the Permit Holder to carry out at the Permit Holder's expense any modifications or actions deemed necessary by DFO to avoid or mitigate existing impacts or to avoid further adverse direct and indirect impacts to White Sharks.

This permit is valid only with activities and species listed herein and for no other purposes. It does not authorize the Permit Holder to kill, buy, sell, or trade an individual of a wildlife species that is listed as extirpated, endangered or threatened, or any part or derivative of such an individual. This permit does not purport to release the Permit Holder from any obligation to obtain permission from or to comply with the requirements of any other regulatory agencies.

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Date of Issue:

Signature of authorizing officer: \_\_\_\_\_

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Donald Humphrey  
Manager, Species at Risk Management Division  
Maritimes Region  
Fisheries and Oceans Canada  
1 Challenger Drive, P.O. Box 1006, Dartmouth, NS, B2Y 4A2

Further information about this permit is available from the above authorizing officer ([Donald.Humphrey@dfo-mpo.gc.ca](mailto:Donald.Humphrey@dfo-mpo.gc.ca)).

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**MacDonald, Jennifer**

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**From:** Sooley, Darrin  
**Sent:** April-18-18 9:40 AM  
**To:** MacDonald, Jennifer  
**Subject:** RE: White shark permit - review

Not sure probably best to send to Regional Manager - Helen Griffiths

Darrin

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**From:** MacDonald, Jennifer  
**Sent:** April-18-18 10:00 AM  
**To:** Sooley, Darrin  
**Subject:** RE: White shark permit - review

Thanks Darrin! Who is the contact for permitting now?

**Jennifer MacDonald**  
Species at Risk Management Division  
(902) 407-8175

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**From:** Sooley, Darrin  
**Sent:** April-18-18 9:16 AM  
**To:** MacDonald, Jennifer  
**Subject:** RE: White shark permit - review

Jennifer I am no longer on assignment in SAR Program I returned to my substantive position in FPP on April 1. I briefed Helen and others in SAR Program before I left so they are familiar with the OCEARCH permit review so I will forward this email along and let them know.

Cheers,

*Darrin R. Sooley*  
Senior Biologist – Coastal Marine Oil & Gas Regulatory Review Unit  
Fisheries Protection Program  
Ecosystem Management Branch  
Fisheries and Oceans Canada – NL Region  
P. O. Box 5667  
St. John's NL A1C 5X1  
Telephone (709)772-3521  
Fax (709)772-5562  
Email [darrin.soley@dfo-mpo.gc.ca](mailto:darrin.soley@dfo-mpo.gc.ca)

---

**From:** MacDonald, Jennifer  
**Sent:** April-18-18 9:21 AM

**To:** Sooley, Darrin  
**Subject:** RE: White shark permit - review

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**Jennifer MacDonald**  
Species at Risk Management Division  
(902) 407-8175

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**Subject:** RE: White shark permit - review

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**To:** Sooley, Darrin  
**Subject:** RE: White shark permit - review

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Ecosystem Management | Gestion des écosystèmes  
Fisheries & Oceans Canada | Pêches & Océans Canada  
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Email | Courriel: [jennifer.macdonald@dfo-mpo.gc.ca](mailto:jennifer.macdonald@dfo-mpo.gc.ca)

## **MacDonald, Jennifer**

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**From:** MacDonald, Jennifer  
**Sent:** April-19-18 9:19 AM  
**To:** Griffiths, Helen  
**Subject:** FW: White shark permit - review  
**Attachments:** SARA Permit\_Assessment and Approval Form\_v4.docx

**Follow Up Flag:** Follow up  
**Flag Status:** Completed

Hi Helen,

Darrin responded to my message below that he has returned to FPP – I think he passed this along to you, but I just wanted to follow-up to see if there is a new contact that I should be in touch with for permitting?

Our 90-day deadline for response to OCEARCH is May 1 – I will check with Donald today to get his final comments on the actual permit but I just wanted to ensure we're all comfortable on the approach/content and will be ready to issue the permit by May 1 (which is coming up closer than I would like!!).

Thanks so much,  
Jenn

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FILE NO: DFO-MAR-2017-17  
17-PNFL-00020

**Ecosystem Management – Assessment and Approval of  
Species at Risk Act (SARA) Section 73 Permit Application**

**1. APPLICANT INFORMATION**

Permit Renewal? ☐ Yes ☒ No  
Permit Amendment? ☐ Yes ☒ No  
Is this a multi-year permit application? ☐ Yes ☒ No  
If so, what is the starting year and ending year:  
Previous Permit Number(s): n/a

**Individual(s) or Organization to appear as the Licensee on the Permit**

Name: OCEARCH  
Contact: George Christopher Fischer  
Email: chris@oearch.org  
Address: 1790 Bonanza Drive, Suite 101B  
Park City, Utah, USA 84060  
Phone: 435-645-8990

The following individuals and those under their direct supervision may undertake the activities authorized by the permit:

Name	Organization
Robert Hueter	Mote Marine Laboratory

**2. ACTIVITIES INFORMATION**

**a) Listed Species Affected:** White Shark (*Carcharodon carcharias*), Atlantic population - Endangered

**b) Project Summary:**

OCEARCH is proposing to conduct scientific research on White Sharks in Canadian waters to provide information in relation to a number of questions, including understanding the role of coastal waters off Nova Scotia and Newfoundland in the life history of the White Shark population, the range of the White Shark population in the northwest Atlantic, the health of White Sharks inhabiting Canadian waters, and adaptations of White Sharks for northwest Atlantic waters.

OCEARCH is proposing to conduct a research expedition in Canadian waters in September/October 2018, involving a collaborative team of scientists who will be onboard and collecting data to support a number of research projects. Sharks will be caught and guided to a research platform on the M/V OCEARCH. Research procedures (sampling and tagging) will be carried out on board the vessel, following which the animals will be released live. OCEARCH has requested a permit to tag 20 sharks in Canadian waters based on their analysis that 60 sharks are required for their various research studies (20 young-of-the-year, 20 immature and 20 mature); to date OCEARCH has tagged 33 sharks in the north Atlantic.

**Actively attracting White Sharks to the fishing boat and the larger research vessel** will be carried out by placing chum in the water using a variety of techniques. Observers on board the vessel scan for signs of White Shark activity and OCEARCH also makes use of drones, to search for White Sharks. To attract sharks, a combination of chum bags, chum boxes, bait tanks, chum tubes and decoys are used.

The chum consists of whale blubber and oil, mackerel and tuna, and/or menhaden oil. OCEARCH will seek a marine mammal permit from DFO to authorize the use of marine mammal material in Canadian waters.

**White Sharks will be caught** from the fishing boat using a circle hook (20/0 or 27/0 with zero offset). The hooks will be rigged with a crossbar bite-blocker (30cm up the leader) to prevent the shark from swallowing the bait. The hook will be attached to stainless steel wire rope (3/32" or 1/8"); the leader is about 10m and will be attached to a braid rope with elasticity properties to reduce hard shock when the initial struggle ensues. Typically within 5-10 minutes of being caught, the White Shark is guided onto the hydraulic lift on the research vessel.

**White Sharks will be lifted out of the water** on a hydraulic lift that is lowered off the research vessel. The lift, which includes side guides and an end gate to prevent the shark from swimming off, will be lowered below the waterline and the shark guided on. The lift will then be slowly raised above the water. Once on the lift, the hook will be removed from the shark's jaw. Oxygenated seawater will be pumped through a hose and mouthpiece (allowing for simultaneous flushing of the gills on both sides of the head) into the shark's buccal cavity at all times while on the lift. The shark will be on its side for the initial 5-7 minutes (to take blood samples, implant the acoustic tag, perform ultrasound) then it is rolled to an upright position (to attach satellite tag). Other procedures undertaken while the White Shark is on the lift will be the collection of swabs (skin mucus, gill surface and cloacal swabs); collection of parasites, collection of semen, fecal, and muscle samples, as well as possibly urine samples if the animal urinates while on deck, and the collection of eye and tail measurements.

**Blood and tissue sampling** will be conducted while White Shark are onboard the vessel. A hypodermic puncture and biopsy punch will be used to obtain blood (<25ml), muscle (<5g), semen, and skin mucus samples.

**Implantation of internal acoustic tags** will be conducted by making a surgical incision to insert a sterilized transmitter (1cm x 6cm) into the coelomic cavity. The incision will be sutured and the sutures will be absorbed over a period of time. OCEARCH is proposing to insert the internal acoustic tags in every White Shark (up to 20) caught in Canadian waters under this permit application.

**Attachment of satellite tags** will be conducted by drilling and bolting Smart Position or Temperature (SPOT) tags on the leading edge of the first dorsal fin. The SPOT tags (Wildlife Computers Model SPOT-257) measure 162 x 57 x 20 mm and weigh 160 g. To attach the tag, four holes are drilled in the dorsal fin with an electric drill (drill bit will be cleaned and sterilized in alcohol before use). The tag will be attached with alcohol-sterilized nylon bolts, stainless locknuts and plastic spacers (standard hardware from the tag manufacturer). Tags will be coated with an antifouling compound. The hardware is designed to retain the tag for five years, after which it will fail and the tag will detach. OCEARCH is proposing to attach a SPOT tag to every White Shark (up to 20) caught in Canadian waters under this permit application.

Pop-up Satellite Archival Tags (PSAT) will be attached via a tether to a subdermal metal dart implanted in the shark's flank below the first dorsal fin. PSAT tags are provided to OCEARCH by a collaborator at the Woods Hole Oceanographic Institution. The number of tags has not been confirmed, but will likely be 4-6 tags. The PSAT tags will be attached, in addition to acoustic and SPOT tags, on 4-6 White Sharks.

OCEARCH is also potentially looking to use a prototype tag that is a combination of a PSAT and SPOT tag. The tag is attached via a darted tether in the same way as a PSAT tag. If these new prototype tags are available, they will be used instead of the PSAT tag on 4-6 White Sharks. As these are prototype tags, OCEARCH is proposing to use these tags in combination with the SPOT tags to validate the new tag's geolocation data.

**c) Analysis of Proposed Activities:**

<b>Location:</b> Atlantic Ocean				
Coastal Nova Scotia:				
<ul style="list-style-type: none"> <li>• Mahone Bay (44° 29.50' N / 64° 13.50' W and adjacent areas</li> <li>• Bay of Fundy (44° 54.00' N / 66° 32.50' W and adjacent areas</li> </ul>				
South Coast of Newfoundland:				
<ul style="list-style-type: none"> <li>• Placentia Bay (47° 05.00' N / 54° 32.00' W</li> </ul>				
Sable Island (43° 56.14' N / 59° 56.59' W)				
<b>Dates:</b> September 18-October 11, 2018				
Proposed Activity	Planned Effects/Outcome		Potential Incidental Effects/Outcome	
	Prohibitions that Apply	Likelihood of the prohibited impact(s)	Prohibitions that Apply	Likelihood of the prohibited impact(s)
Actively attracting White Sharks to a vessel (i.e., chumming)	Harass	Med	Harm Kill	Low Low
Capture of White Sharks	Harass Harm Capture	High Low High	Kill	Low
Lifting White Sharks out of the water	Harass Harm Capture	High Low High	Kill	Low
Blood and tissue sampling	Harass Harm Possess	Med Low High	Harm	Low
Implantation of internal acoustic tags	Harass Harm	Med Low	Kill	Low
Attachment of satellite tags – SPOT tags	Harass Harm	Med Low	Kill	Low
Attachment of satellite tags – PSAT tags	Harass Harm	Med Low	Kill	Low

Impacts to individual White Sharks would result from any distress associated with the approaching vessel, being caught and brought onboard the vessel and out of the water, the application of the different tag types and the collection of biological samples.

**Actively attracting White Sharks to a vessel (i.e., chumming)**

A number of studies suggest that the presence of chum may be linked to modification of White Sharks' normal swimming and/or hunting behaviours, although the effects are likely short term when chum is used for short term research projects.<sup>1</sup> It is possible that attracting a White Shark will cause the individual to stray from patrolling for food or from mating. Disturbance to normal feeding behaviours may result in energetic costs.<sup>2</sup>

There is a possibility that attracting sharks to the fishing boat or the research vessel may result in collisions between the shark and the vessel and that the presence of the vessel may cause behavioural changes.

<sup>1</sup> NOAA. 2014. Draft Programmatic Environmental Assessment of Potential White Shark Research and Education Projects within the Gulf of the Farallones and Monterey Bay National Marine Sanctuaries. [https://nmssanctuaries.blob.core.windows.net/sanctuaries-prod/media/archive/library/pdfs/gfnms\\_draft\\_white\\_shark.pdf](https://nmssanctuaries.blob.core.windows.net/sanctuaries-prod/media/archive/library/pdfs/gfnms_draft_white_shark.pdf)

<sup>2</sup> Semmens, J.M., Payne, N.L., Huveneers, C., Sims, D.W. & Bruce, B.D. 2013. Feeding requirements of White Sharks may be higher than originally thought. Sci. Rep. 3, 1471; DOI:10.1038/srep01471 (2013).

### **Catch of White Sharks**

Catch and release fishing is a source of stress to White Sharks due to the potential for long fight times (exhausting the individuals) and injury from wounds caused by the hooks. Long capture times have been known to kill bony fish and other sharks.<sup>3</sup> Physiological disruptions to fish result from the high anaerobic activity, muscle fatigue and time spent out of water caused by capture using most fishing techniques.<sup>4</sup>

Injury can result from the wound caused by the hook, although the extent of the tissue damage or injury will depend on the location of the hook and the type of gear. Sub-lethal injury can result from removing hooks or leaving them in place in the throat, esophagus or gut. In the short term, a hook in the mouth will cause a loss of blood, but the wound would be expected to heal within a year or less. Circle hooks are known to cause lower incidences of internal injury than conventional J hooks.<sup>5</sup>

Although not specific to White Shark, a study in Australia examined post release survival in Shortfin Mako by attracting individuals to a boat using chum, then using monofilament line and either J hooks or circle hooks to catch the sharks. The study showed that the length of the fight time did not impact survival. Circle hooks significantly reduced foul hooking. The study showed that hook choice affected the likelihood of mortality, while the species' is able to cope with long fight times and associated physiological responses to capture due to its endothermy and high aerobic scope.<sup>6</sup>

It has been suggested that sharks, in general, are capable of recovery from physiological stress associated with capture and that any mortality is more likely linked to the extent of any physical injuries.<sup>7</sup>

### **Lifting White Sharks out of the water**

The research platform is raised and the White Sharks are lifted from their natural, in-water environment. This removal from the water likely results in physiological stress and possible oxygen deprivation.

Lifting White Sharks out of the water, onto a hard raised platform, may create excessive pressure on tissues and organs that usually do not bear weight. This impact may be greater in larger individuals.

While there are concerns about damage to internal organs, there is no evidence reported of internal organs being crushed when sharks are removed from the water.<sup>8</sup> However, if sharks are thrashing on the deck, this could lead to internal injuries.

OCEARCH has taken blood samples in the first minute and the last minute on the lift for 120 White Sharks handled in this manner and found stress levels remain relatively low throughout the handling time. Higher amounts of stress due to capture were shown in very young White Sharks (however OCEARCH is not proposing to catch young sharks in Canadian waters).

### **Blood and tissue sampling**

The *Canadian Council on Animal Care Guidelines on Care and Use of Fish in Research* suggest that blood samples be up to 1ml/kg body size. The volume proposed to be collected by this project is well under this recommended amount.

The retention of the blood and tissue samples involves possession of parts of individuals.

### **Implantation of internal acoustic tags**

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<sup>3</sup> NOAA 2014

<sup>4</sup> Skomal, G.B. 2007. Evaluating the physiological and physical consequences of capture on post-release survivorship in large pelagic fishes. *Fisheries Management and Ecology*. 14: 81-89.

<sup>5</sup> NOAA 2014

<sup>6</sup> French R.P., Lyle J., Tracey S., Currie S., Semmens J.M. 2015. High survivorship after catch-and-release fishing suggests physiological resilience in the endothermic shortfin mako shark (*Isurus oxyrinchus*). *Conserv Physiol* 3: doi:10.1093/conphys/cov044.

<sup>7</sup> Skomal 2007

<sup>8</sup> NOAA 2014

Implanting internal acoustic tags requires making a surgical incision, from which there could be a risk of infection or causing harm to the individual.

#### **Attachment of satellite tags (SPOT and PSAT)**

In terms of physical injury associated with the tagging, shark species in general are very resilient to superficial cuts and have a tremendous capacity to heal from injury.<sup>9</sup> Similar and much more extensive lacerations occur frequently during mating behaviours, and one of the identifying characteristics of a mature female shark is deep scarring along her dorsal musculature. The tagging site is expected to close over very quickly with minimal effect on the animal, as has been observed in other species held in captivity after tagging.

Various studies have examined possible longer term effects of electronic tags or data loggers on the swimming efficiency of sharks, but results have been variable.<sup>10</sup> There may be a marginally increased drag while swimming due to the external tag.

A study from South Africa suggests that SPOT tags can cause permanent cosmetic and structural damage to the dorsal fins of White Sharks, depending on how long the tag is attached for. Tags that detach within 12-24 months did not seem to cause long term damage; while after 24 months permanent damage to the dorsal fin was reported. However, the study did not show that the damage to the dorsal fin resulted in impacts to long term survival or body growth.<sup>11</sup>

Research from Monterey Bay Aquarium also showed that real-time satellite tags attached with multiple bolts on juvenile White Sharks affects the growth of the dorsal fin (growing around the tag or causing a deflection to the tip of the fin). They suggested that there may be more of a reaction to the presence of the bolts and tag in growing tissue.<sup>12</sup>

OCEARCH has provided photographs of White Sharks observed years after tagging that show that the fins have healed and are functioning properly.

#### **Post Release Behaviour and Longer Term Effects**

Results from research in which White Sharks were caught and restrained using an in-water stretcher and then tagged, has shown a six to 48-hour recovery period for individuals after capture and tagging.<sup>13</sup>

Post-release behavioural studies by OCEARCH collaborating scientists using accelerometers attached to the sharks have shown recovery and resumption of natural swimming behaviour within approximately 6 hours after release.

Research conducted off the west coast of California that involved tagging 21 White Sharks (2007-2012), found that they resumed 'normal' behaviours after tagging, as determined by their migration patterns. These sharks were tagged with SPOT tags (using various methodology including being lifted onto a platform out of the water and being tagged while alongside the research boat).<sup>14</sup>

It has been suggested that catch and release of marine pelagic fish may have sublethal population level effects due to reduced individual fitness. However, as these population level effects are difficult to assess in highly migratory species with poorly understood life histories, this has not been quantified or studied in depth.<sup>15</sup>

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<sup>9</sup> NOAA 2014

<sup>10</sup> Hammerschlag, N., 2011. A review of shark satellite tagging studies. J. Exp. Mar. Biol. Ecol. doi:10.1016/j.jembe.2010.12.012

<sup>11</sup> Jewell O.J.D., Wcisel M.A., Gennari E., Towner A.V., Bester M.N. 2011. Effects of Smart Position Only (SPOT) Tag Deployment on White Sharks *Carcharodon carcharias* in South Africa. PLoS ONE 6(11): e27242. doi:10.1371/journal.pone.0027242

<sup>12</sup> NOAA 2014

<sup>13</sup> NOAA 2014

<sup>14</sup> NOAA 2014

<sup>15</sup> Skomal 2007

**The applicant will be directed to resubmit application to the appropriate agency. Go to Assessment Summary.**

4. Is it certain or likely that performing any of the proposed activities will affect the SARA-listed species concerned in a way to contravene the general prohibitions of SARA (subsections 32(1), 32(2), section 33, subsections 36(1), 58(1), 60(1) and 61(1))?

☒ Yes ..... **Go to next question**  
☐ No .....

**A SARA permit is not necessary. The applicant will be advised of this in writing. Go to Assessment Summary.**

5. Do any of the exceptions listed in SARA Section 83 apply to the proposed activities concerned?

☐ Yes .....

**A SARA permit is not necessary. The applicant will be advised of this in writing and the basis on which an exception applies will be described here. Go to Assessment Summary.**

☒ No .....

**A SARA Section 73 permit is required to avoid contravention of the prohibitions of SARA. DFO will proceed with the application to assess eligibility. Go to Eligibility Assessment.**

#### **Eligibility Assessment**

The following two questions assess whether the proposed activities are eligible for a SARA Section 73 permit.

**1. Section 73(2):** The purpose of the proposed activities is described by **one or more** of the following:

☒ The activity is scientific research relating to the conservation of SARA-listed species and will be conducted by qualified persons

☐ The activity benefits the species or is required to enhance its chance of survival in the wild.

☐ Affecting the SARA-listed species is incidental to carrying out the activity

The proposed activities aim to answer a number of research questions, both through the tracking of individual White Sharks that will be tagged and through analysis on blood and other tissue samples.

The draft Recovery Strategy for White Shark identifies the following as high priority research and management approaches:

- undertake scientific research to better understand population dynamics, distribution and habitat use.
- collect and maintain White Shark sightings information; maintain this information in a database and share via network

OCEARCH's Chief Science Advisor is Dr. Robert Hueter. He is the Director of the Center for Shark Research at the Mote Marine Laboratory and has more than 25 years experience in shark research.

☒ Yes ..... **Go to next question**

☐ No .....

**The proposed activities are not eligible for a SARA Section 73 Permit. Go to Assessment Summary.**

**2. Section 73(3):** The proposed activities meet **all** of the following pre-conditions:

As little is known about White Shark mating behaviour, it is unknown whether tagging could have an impact on mating.<sup>16</sup>

There is anecdotal evidence of at least one White Shark having died following interactions with OCEARCH using the methods proposed here.

### Summary

Based on the above assessment, the following activities have the potential to contravene the SARA prohibitions and therefore must be authorized under SARA:

- Actively attracting White Sharks to a vessel;
- Catch and release of White Sharks and lifting individuals out of the water on a hydraulic lift;
- Collecting biological samples from White Sharks;
- Implanting internal acoustic tags; and
- Attaching SPOT and PSAT tags to White Sharks.

The effects that these activities may cause to White Sharks include:

- Capture and harassment of, and potentially harm to, individuals,
- Possession of samples from individuals, and
- Although unlikely, killing of, individuals.

The Species at Risk Management Division has concluded that the activities associated with the above project are likely to affect the **White Shark, Atlantic population**, in a manner that is prohibited by SARA, and therefore a SARA Section 73 permit is considered necessary to engage in the proposed activities.

## 3. REGULATORY ASSESSMENT OF APPLICATION

### Necessity Assessment

Work through the following five questions to determine the appropriate action for DFO to take in response to the permit application.

1. Is it likely that one or more species listed on Schedule 1 of the SARA occurs at any of the locations identified for the proposed activities?

☒ Yes ..... **Go to next question**  
☐ No .....

**A SARA permit is not necessary. The applicant will be informed in writing and advised to ensure any other required authorizations are obtained before proceeding with the activities. Go to Assessment Summary.**

2. Are any of the SARA-listed species concerned considered an "Aquatic Species" as per the definition in the *Fisheries Act*?

☒ Yes ..... **Go to next question**  
☐ No .....

**The applicant will be directed to resubmit the application to the appropriate agency. Go to Assessment Summary.**

3. Are the locations at which any of the activities are proposed to take place under the jurisdiction of Fisheries and Oceans Canada?

☒ Yes ..... **Go to next question**  
☐ No .....

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<sup>16</sup> NOAA 2014



- ☒ All reasonable alternatives to the activity that would reduce the impact on the species have been considered and the best solution has been adopted

In the consideration of alternatives to the proposed research, there are a number of alternatives that should be considered. The first alternative to consider would be to not undertake the activity and not conduct the research; however, given the many unknowns about the species this would not represent the best solution as it would be a loss of an opportunity to learn more.

There are no alternative locations to conduct the research, as it must be conducted within the range of the species.

In relation to the proposed activities, overall the applicant asserts that the methods and procedures proposed are the safest and most successful way of obtaining the necessary samples and attaching SPOT tags.

#### **Attracting and Catching White Shark**

- The alternative to chumming for White Shark is to not use chum, which would limit the ability to sight White Sharks to passive observations. Given the low numbers in a large area, chance encounters would be low, which would reduce or even eliminate the success rate of researchers attempting to deploy tags or obtain samples.

#### **Catching, restraining and lifting the shark out of the water**

- Alternative approaches include (1) attracting a shark and sampling/tagging it without restraining or catching it and (2) attracting a shark and catching it, but conducting sampling/attaching tags while the shark remains in the water.
- The following summarizes the type of tagging and sampling that is possible under each alternative:

	(1) No Capture	(2) Capture and Tag in Water	(3) Capture and Use of Lift
Tag Types	PSAT Acoustic (external)	SPOT PSAT Acoustic (external)	SPOT PSAT Acoustic (internal or external)
Other Samples	– muscle samples	– blood samples – swabs (skin mucus) – muscle samples	– blood samples – swabs (skin mucus, gill surface and cloacal swabs) – muscle samples – parasite samples – semen samples – fecal samples – urine samples (opportunistic) – eye/tail measurements – ultrasound

- Under alternative (1), the success rate for tagging and collecting samples would likely be less than using one of the alternative methodologies, which involve catching the sharks. This approach can also require chasing the individuals with a small to mid-sized boat, which can increase stress levels. There is a risk with this approach that tags would not be attached properly.
- Under alternative (2), some researchers have suggested that keeping the shark in the water reduces the stress experienced by the shark as a result of being lifted from the water. However, OCEARCH has indicated that sharks are more likely to struggle if they remain in the water, while being on the lift quiets the animals and therefore they conclude that the proposed method reduces the potential for harm to the sharks. Sampling and tagging using an alongside-boat method requires calm sea conditions, which are often not encountered. Working alongside a boat with a large animal that is likely to be struggling also increases the risk to researchers.
- With respect to the precise methodology proposed to capture sharks, the approaches proposed

likely present the best alternative to reduce potential impacts. Alternatives would be to use a 'J' hook instead of a circle hook, to not use the bite blocker, to not embed the leaders in rope. However, all of these alternatives would increase the risk of internal (e.g., gut-hooking) or external (e.g., lacerations) injury to the sharks.

#### **Blood and tissue sampling**

- An alternative method to collecting biological samples, would be collect samples by harpoon, while the shark remains in the water. However, the collection of blood samples, swabs of the skin mucus, gill surface and cloacal, parasite collection and semen samples require catching and controlling the animal. Further, attempting to obtain samples in the water increases the risk of sample contamination, loss of sample and infections in the shark. Muscle samples are taken from the site of the PSAT tag attachment reducing sample wounds on the shark.

#### **Tagging**

- SPOT, PSAT and acoustic tags all collect different types of data:
  - SPOT tags transmit location and other data in real time. Information is transmitted while the tag is attached to the shark; the data signal from these tags is sent when the shark's dorsal fin is at the surface. SPOT tags may transmit data for up to 3-5 years. To obtain real-time geolocation data from an animal that is wide ranging within areas that are previously unknown, SPOT tags provide the best option for collecting this data.
  - Data from PSAT tags is stored on the device and retrieved after the tag detaches from the shark. PSAT tags will collect data for approximately one year. PSAT tags provide archived temperature and depth data, but the geolocation data is less precise and not available in real-time.
  - Acoustic tags are useful to detect the arrival of an animal in an area where underwater acoustic receivers have been deployed (typically well-studied inshore areas). These tags provide fine-scale geolocation data, but only in areas where there are acoustic receivers.
- OCEARCH has indicated that to understand an animal's large scale movements and migration, SPOT tags are the most effective in revealing the precise tracks and this data, in their perspective, cannot be substituted with data from PSAT or acoustic tags. Further, the real time data from SPOT tags support their educational and outreach objectives.
- There are alternative attachment methodologies for tags:
  - Acoustic tags can be attached externally rather than internally. While some researchers have successfully utilized externally attached acoustic tags, OCEARCH has indicated that there are concerns with the risk that external tags can be shed. In addition, internal tags have been shown to transmit for up to 5 years (and even up to 10 years), while external tags have a shorter lifespan of approximately 1 year. OCEARCH has further indicated that the internal tags do not cause on-going harm to sharks once implanted.
  - SPOT tags can also be attached as floating tags, however OCEARCH indicated concern that floating SPOT tags can be fouled, shed and lost from the animal very rapidly.
  - Other researchers have developed a technique to attach SPOT tags with a single bolt, rather than the four bolt attachment methodology proposed by OCEARCH. OCEARCH has indicated that their information indicates that the single bolt attachment has a shorter lifespan, limiting the data that can be collected. Additionally, the single bolt attachment requires a saddle in which the tag is placed when attached; this saddle may decrease hydrodynamics for the sharks on an on-going basis.

- ☒ All feasible measures will be taken to minimize the impact of the activity on the species or its critical habitat or the residence of its individuals

The following measures were proposed by OCEARCH to minimize the impacts of the activities:

- individuals will not be chased by the vessel, but will be attracted using chum;
- gear will be used that will minimize the chance that animals are gut-hooked (including using circle hooks and a crossbar bite-blocker);
- animal struggles and injury will be minimized by:

- using a leader attached to a braid rope with elasticity properties to help reduce hard shock during the initial struggle;
  - using a 10m leader length in case the shark rolls in the line to ensure that the shark cannot bite through the rope and escape (retaining the hook and leader);
  - embedding the leader inside a three-strand rope to give it a thicker diameter so that if the shark rolls, the thicker rope does not cut into the sharks' skin and is easier to unwrap;
  - using heavier tackle that keeps enough pressure on the shark so that the line is stretched tight and the shark cannot turn and roll.
- all research procedures will be conducted within 20 minutes;
- while on the research platform:
  - oxygenated seawater will be pumped through a hose and mouthpiece (allowing for simultaneous flushing of the gills on both sides of the head) into the shark's buccal cavity at all times;
  - a tail rope will be used to prevent the animal from causing harm to itself and others;
  - the head and eyes will be covered with wet terrycloth towel to reduce stress and keep eyes moist;
  - skin will be kept wet during in-air procedures to prevent drying;
  - animal stress will be monitored by observing skin colouration, presence of blood pooling, gill movements, and animal activity:
    - if stress is detected in the animal, a blood sample will be taken to evaluate the shark's conditions;
    - if acute stress is observed, the animal will be released immediately.
- OCEARCH is currently seeking approval of their animal care plan from Jacksonville University and will notify DFO once that the approved plan is in place.

In addition, the permit will require that:

- the total time of engagement with a single White Shark be limited to 40 minutes (from the time it is initially hooked until it is released);
- a maximum number of 20 White Sharks can be tagged;
- as the impact on fin development of attaching SPOT tags has been shown to be greater in juvenile sharks<sup>17</sup>, only White Sharks greater than 3.5 metres in total length can be caught and tagged;
- a DFO Scientist or Observer or other representative must be onboard during a subset of the expedition, as determined by DFO;
- work will cease and DFO will be contacted immediately if there is any mortality of a White Shark or if a White Shark receives any significant injury and no further attempts at catching or tagging White Sharks will be resumed until approved by DFO;
- all interactions with White Sharks (including location of capture/tagging events; number and gender/age of all White Sharks caught and tagged) and all mitigation measures employed will be reported to DFO. In addition, unsuccessful tagging attempts, in which White Sharks were observed but not caught or tagged, will also be reported to DFO (location, length estimate, gender (if visible), weight).

☒ The activity will not jeopardize the survival or recovery of the species

Tagging of White Sharks is unlikely to jeopardize the survival or recovery of the population. The recovery goal in the draft recovery strategy is to: "Maintain or increase the population of White Sharks that frequent Atlantic Canadian waters." No mortality is expected as a result of the activities, and therefore recovery will not be compromised. Even in the very unlikely event that mortality occurs during the activities, Science advice indicates that the population of White Sharks in the NW Atlantic is increasing and current mortality levels (due to incidental capture in fisheries) would have to increase substantially before population trajectories would be predicted to decline. Therefore there is a high likelihood that

<sup>17</sup> Jewell et al. 2011

recovery goals can be achieved under various scenarios of allowable harm for White Shark, even if annual bycatch mortality increases from historical estimates.<sup>18</sup>

- ☒ Yes ..... **Go to Consultation Assessment**  
☐ No .....

**The proposed activities are not eligible for a SARA Section 73 Permit. Go to Assessment Summary.**

### **Consultation Assessment**

The following two questions assess whether consultation with an outside party is required before issuing a SARA Section 73 Permit for the proposed activities:

1. **Section 73(4):** Do the proposed activities concern a species in an area in respect of which a wildlife management board is authorized by a land claims agreement to perform functions in respect of wildlife species?

☐ Yes ..... **Go to Assessment Summary**  
☒ No ..... **Go to next question**

2. **Section 74(5):** Do the proposed activities concern a species in a reserve or any other lands that are set apart for the use and benefit of a band under the Indian Act?

☐ Yes ..... **Go to Assessment Summary**  
☒ No ..... **Go to Assessment Summary**

### **Assessment Summary**

The above assessment is summarized below. In order to recommend that a SARA Section 73 Permit be issued for the proposed activities, the above assessment must demonstrate that doing so is warranted, lawful, and if applicable, that all consultation requirements of SARA s. 73(4) or 73(5) have been fulfilled.

1. The proposed activities warrant the need for a SARA Section 73 Permit.

☒ Yes ..... **Go to next question**  
☐ No .....

**A SARA permit is not necessary. The applicant will be advised of this in writing. Go to EM Permit Decision.**

2. The proposed activities are consistent with all of the eligibility requirements of SARA Section 73.

☒ Yes ..... **Go to next question**  
☐ No .....

**The proposed activities are not eligible for a SARA s.73 Permit. Go to EM Permit Decision.**

3. The permit decision, proposed activities, and any permit contents require consultation with an outside party.

☐ Yes .....  
**Undergo consultation with the appropriate party before proceeding further in the permitting process.**

☒ No .....  
**Issue a SARA s.73 Permit. Go to Ecosystem Management Permit Decision.**

<sup>18</sup> DFO. 2017. Evaluation of Scope for Harm for White Shark (*Carcharodon carcharias*) in Atlantic Canada. DFO Can. Sci. Advis. Sec. Sci. Resp. 2017/025.

#### 4. REVIEW

Input sought from:

Name	DFO Sector
Aimee Gromack	DFO Maritimes - SARMD
Heather Bowlby / Warren Joyce	DFO Maritimes - Science

#### 5. ECOSYSTEM MANAGEMENT PERMIT DECISION

☐ A SARA Section 73 Permit is not considered necessary to engage in the proposed activities.

☒ Issue SARA Section 73 Permit subject to the conditions outlined in the SARA Section 73 Permit for DFO-MAR-2017-17.

☐ Do not issue Section 73 Permit.

#### 6. SIGN-OFF

Reviewed by:

\_\_\_\_\_  
Donald Humphrey  
Regional Manager  
Species at Risk Management Division (Maritimes  
Region)

\_\_\_\_\_  
Date

\_\_\_\_\_  
Helen Griffiths  
Regional Manager  
Species at Risk Management Division (Newfoundland  
and Labrador Region)

\_\_\_\_\_  
Date

## MacDonald, Jennifer

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**From:** MacDonald, Jennifer  
**Sent:** April-23-18 12:42 PM  
**To:** 'Robert Hueter'  
**Cc:** Chris Fischer; Brandon Eyre; Celes Eckerman; Forsey, Sue  
**Subject:** RE: Permitting information

**Categories:** To file

Hi Bob,

We are just finalizing the paperwork and plan to have the permit to you by next week. I have copied my colleague Sue Forsey on this message, she is with DFO's Newfoundland and Labrador office and is working on the permitting now, as Darrin has changed positions.

Unfortunately the other permitting and approval processes are outside our control. We are not able to influence the timing of those processes, although I can appreciate that is challenging for you. My only advice would be to follow-up through the other permitting processes and the contacts there to explain the situation, but unfortunately there is nothing that Sue or I can do at our end.

I will be in touch with the SARA permit very soon.

Best regards,  
Jenn

**Jennifer MacDonald**  
Species at Risk Management Division  
(902) 407-8175

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**From:** Robert Hueter [mailto:rhuetter@mote.org]  
**Sent:** April-20-18 12:47 PM  
**To:** MacDonald, Jennifer; Sooley, Darrin  
**Cc:** Chris Fischer; Brandon Eyre; Celes Eckerman  
**Subject:** Re: Permitting information

Dear Darrin & Jenn:

Hope you both are doing well. I'm checking in on the status of our SARA permit. Can we expect this to arrive soon?

Also, looking for some help from your office. We have been told our permit application to bring the M/V OCEARCH in to Canadian waters to conduct fisheries research is out for stakeholder comment, and since we don't need the permit until September, we're being told this comment period will be open through August. I'm sure you can appreciate that that doesn't work for us. It's impossible to plan a major expedition and move our ship for this without at least 90 days' notice on permitting. This is also holding up our progress on other permits, such as the individual province permits from Nova Scotia and Newfoundland to work in their waters. Can you help us entangle this situation? Any advice or

assistance would be extremely welcome. I'm ccing Brandon Eyre and Celes Eckerman, our two folks dealing with these permit issues.

We appreciate an update on the SARA permit and any and all help you can provide on the rest of the permitting issues. Thanks to you both.

Bob

**ROBERT E. HUETER, Ph.D.**

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Perry W. Gilbert Chair in Shark Research  
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On 3/22/2018 2:03 PM, MacDonald, Jennifer wrote:

Hi Bob and Chris,

Thank you for a good conversation this afternoon and the additional information you provided us.

As a follow-up to your question about other permitting or approvals required, you will require a licence under Section 52 of the Fishery (General) Regulations, which are licences issued for educational, experimental, public display or scientific purposes. The latest version of the application form can be obtained by emailing: [RegionalLicensing.XMAR@dfo-mpo.gc.ca](mailto:RegionalLicensing.XMAR@dfo-mpo.gc.ca) (this is the same email address to which completed applications can be sent). I believe that this same group may also process the Foreign Fishing Vessel Licences, which are issued under the Coastal Fisheries Protection Regulations. I would advise that you contact the Licencing office to ask about both applications. This contact information is for the Maritimes Region of DFO (off the coast of Nova Scotia); you will also need to apply separately for these permits from Newfoundland Region. I have copied Darren on this message as he can confirm the contact in Newfoundland Region. This is likely why its seemed that you were referring to two applications that sounded similar when we were discussing by phone – those would likely have been the two Section 52 Licence applications for the respective regions.

Should you be using marine mammal material in the chum, you may also need approval under the Marine Mammal Regulations.

Best regards,  
Jenn

**Jennifer MacDonald**

Species at Risk Biologist | Biologiste des espèces en peril

Species at Risk Management Division | Division de la gestion des espèces en péril

Ecosystem Management | Gestion des écosystèmes

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No information has been removed or severed from this page



## MacDonald, Jennifer

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**From:** MacDonald, Jennifer  
**Sent:** April-23-18 12:28 PM  
**To:** Humphrey, Donald  
**Subject:** RE: For your review: OCEARCH Permit documents

**Follow Up Flag:** Follow up  
**Flag Status:** Completed

Hi Donald,

I just spoke with Newfoundland Region and we are trying to coordinate finalizing OCEARCH's permit; our 90-day deadline is up next Tuesday (May 1). I have updated the approval and assessment form based on your comments, but wanted to double check if you have any comments on the permit itself. I can then share the final versions with Newfoundland and then print them for your signature.

Thanks!

Jenn

**Jennifer MacDonald**  
Species at Risk Management Division  
(902) 407-8175

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**From:** MacDonald, Jennifer  
**Sent:** April-05-18 9:57 PM  
**To:** Humphrey, Donald  
**Subject:** RE: For your review: OCEARCH Permit documents

Thanks Donald. I'll make the changes to the assessment form. I just made a few small changes to the actual permit to incorporate your comments from the review form. The permit is saved [here](#).

I will follow up with Darrin next week to try and get things finalized from their end. We did have two outstanding points in the permit that he was seeking Science input on (the maximum length of time and the minimum size of shark) – I don't think we're considering removing them as conditions but just getting additional feedback on the values indicated. He did indicate that he wasn't comfortable sharing the draft permit with OCEARCH as we had discussed potentially doing. Would you suggest that I flag these two conditions with OCEARCH in advance of finalizing the permit?

Thanks,  
Jenn

**Jennifer MacDonald**  
Species at Risk Management Division  
(902) 407-8175

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**From:** Humphrey, Donald  
**Sent:** April-05-18 1:11 PM  
**To:** MacDonald, Jennifer  
**Subject:** RE: For your review: OCEARCH Permit documents

Hi Jenn, attached are my comments on the assessment form. Just wondering if you have updated the permit at all before I review it? The version you sent me is attached.

Also, would you be able to send me links to documents going forward? It helps me with quickly saving any edits in the same location.

Thanks, Donald

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**From:** MacDonald, Jennifer  
**Sent:** March-23-18 1:59 PM  
**To:** Humphrey, Donald  
**Subject:** RE: For your review: OCEARCH Permit documents

Hi Donald,

Attached is a revised version of the Assessment and Approval form incorporating some of the information we discussed with OCEARCH yesterday. I've also sent this to Darrin. I've asked him to confirm if he is comfortable if we share a draft of the permit itself with OCEARCH, once you've had a chance to review it.

Thanks,  
Jenn

**Jennifer MacDonald**  
Species at Risk Management Division  
(902) 407-8175

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**From:** MacDonald, Jennifer  
**Sent:** March-20-18 2:22 PM  
**To:** Humphrey, Donald  
**Subject:** For your review: OCEARCH Permit documents

Hi Donald,

Attached are the draft Assessment and Approval Form as well as the draft Permit for OCEARCH for your review.

You will see that there are a couple of items highlighted in the documents, as well as a few comments for us to discuss. These documents have both been reviewed by Aimee and by Darrin Sooley. They also reflect input from Heather and Warren, although the documents themselves have not been reviewed by Science.

We have a call with OCEARCH on Thursday afternoon. There are a few items (also highlighted in the attached), that we may want to discuss with them at that time:

- we require confirmation of the expedition leader/lead scientist to include in the documentation (while Bob Hueter has been my main point of contact and providing the information related to the application, I do not believe he is necessarily onboard for all expeditions).
- the OCEARCH Animal Care Protocol is pending approval from Jacksonville University; I don't know if we want to wait until we have a copy of that to confirm the conditions in our permit?
- OCEARCH has requested to use internally implanted acoustic tags; there can be some concerns with surgical implantation and potentially increased risks to the sharks; we may wish to discuss the use of externally attached tags.
- likewise, there is a newer methodology that only requires a single bolt for SPOT tag attachment, rather than the 4 bolt methodology that OCEARCH has proposed; there may be technical limitations due to the tags OCEARCH already has, but again, we may wish to discuss this with them.
- we are also proposing that we restrict tagging to sharks greater than 14 feet (although we may be able to consider a somewhat smaller size) to avoid tagging juveniles, for whom fin damage from SPOT tags may be greater.
- we are also proposing limiting the total time of engagement with an individual shark to somewhere between 30 and 40 minutes (from time of capture to release); OCEARCH has indicated in their application that usually within 5-10 minutes

of catching a shark, they are able to guide it onto the lift and the time on the lift is limited to 20 minutes (the low end of the time range would be just allowing for the 10 minutes from capture to lift, with 20 minutes on the lift; the higher end of the time limit provides some buffer to this for the raising of the lift, etc.).

There are a few outstanding concerns that continue to be flagged:

-I have not included any conditions in the SARA permit related to the amount or type of chum to be used. In other jurisdictions, there have been limitations placed on the amount of chum that can be put in the water on a daily basis; this seemed to be primarily a public safety issue and was required where chumming would be done close to shore. OCEARCH has indicated that chum includes whale blubber and oil, mackerel/tuna and/or menhaden oil. Warren has raised concerns about the sourcing of whale material for chum (indicating they may have used right whale material in the past). OCEARCH has indicated that they will seek appropriate permit for importation and/or use of marine mammal material in Canada. As this is outside the SARA permitting process, I have not included any conditions around the type of chum in the permit, however, if marine mammal material (in the US this is sourced from dead, stranded whales, were to possibly include any SARA species, additional permitting would be required). We may wish to discuss this aspect further.

Aimee and Katie have been discussing the potential need for a communications plan to be in place either before the permit is issued or at a minimum before the research expedition takes place. Can we discuss timing of issuing the permit in relation to development of such a plan?

I have a hard copy folder of all the documents provided by OCEARCH if you want to review any other materials before the call on Thursday. Should I also set up a time for us to meet before that call to go over the attached?

Thanks,  
Jenn

**Jennifer MacDonald**

Species at Risk Biologist | Biologiste des espèces en péril  
Species at Risk Management Division | Division de la gestion des espèces en péril  
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## **MacDonald, Jennifer**

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**From:** Forsey, Sue  
**Sent:** April-24-18 10:38 AM  
**To:** MacDonald, Jennifer  
**Subject:** permit assessment form

**Categories:** To file

Hi Jenn,

I was talking to Helen and she said she doesn't need to sign your assessment form. She'll just sign our permit.

Sue



FILE NO: DFO-MAR-2017-17  
17-PNFL-00020

**Ecosystem Management – Assessment and Approval of  
Species at Risk Act (SARA) Section 73 Permit Application**

**1. APPLICANT INFORMATION**

Permit Renewal? ☐ Yes ☒ No  
Permit Amendment? ☐ Yes ☒ No  
Is this a multi-year permit application? ☐ Yes ☒ No  
If so, what is the starting year and ending year:  
Previous Permit Number(s): n/a

**Individual(s) or Organization to appear as the Licensee on the Permit**

Name: OCEARCH  
Contact: George Christopher Fischer  
Email: chris@oceanarch.org  
Address: 1790 Bonanza Drive, Suite 101B  
Park City, Utah, USA 84060  
Phone: 435-645-8990

The following individuals and those under their direct supervision may undertake the activities authorized by the permit:

Name	Organization
Robert Hueter	Mote Marine Laboratory

**2. ACTIVITIES INFORMATION**

**a) Listed Species Affected:** White Shark (*Carcharodon carcharias*), Atlantic population - Endangered

**b) Project Summary:**

OCEARCH is proposing to conduct scientific research on White Sharks in Canadian waters to provide information in relation to a number of questions, including understanding the role of coastal waters off Nova Scotia and Newfoundland in the life history of the White Shark population, the range of the White Shark population in the northwest Atlantic, the health of White Sharks inhabiting Canadian waters, and adaptations of White Sharks for northwest Atlantic waters.

OCEARCH is proposing to conduct a research expedition in Canadian waters in September/October 2018, involving a collaborative team of scientists who will be onboard and collecting data to support a number of research projects. Sharks will be caught and guided to a research platform on the M/V OCEARCH. Research procedures (sampling and tagging) will be carried out on board the vessel, following which the animals will be released live. OCEARCH has requested a permit to tag 20 sharks in Canadian waters based on their analysis that 60 sharks are required for their various research studies (20 young-of-the-year, 20 immature and 20 mature); to date OCEARCH has tagged 33 sharks in the north Atlantic.

**Actively attracting White Sharks to the fishing boat and the larger research vessel** will be carried out by placing chum in the water using a variety of techniques. Observers on board the vessel scan for signs of White Shark activity and OCEARCH also makes use of drones, to search for White Sharks. To attract sharks, a combination of chum bags, chum boxes, bait tanks, chum tubes and decoys are used.

The chum consists of whale blubber and oil, mackerel and tuna, and/or menhaden oil. OCEARCH will seek a marine mammal permit from DFO to authorize the use of marine mammal material in Canadian waters.

**White Sharks will be caught** from the fishing boat using a circle hook (20/0 or 27/0 with zero offset). The hooks will be rigged with a crossbar bite-blocker (30cm up the leader) to prevent the shark from swallowing the bait. The hook will be attached to stainless steel wire rope (3/32" or 1/8"); the leader is about 10m and will be attached to a braid rope with elasticity properties to reduce hard shock when the initial struggle ensues. Typically within 5-10 minutes of being caught, the White Shark is guided onto the hydraulic lift on the research vessel.

**White Sharks will be lifted out of the water** on a hydraulic lift that is lowered off the research vessel. The lift, which includes side guides and an end gate to prevent the shark from swimming off, will be lowered below the waterline and the shark guided on. The lift will then be slowly raised above the water. Once on the lift, the hook will be removed from the shark's jaw. Oxygenated seawater will be pumped through a hose and mouthpiece (allowing for simultaneous flushing of the gills on both sides of the head) into the shark's buccal cavity at all times while on the lift. The shark will be on its side for the initial 5-7 minutes (to take blood samples, implant the acoustic tag, perform ultrasound) then it is rolled to an upright position (to attach satellite tag). Other procedures undertaken while the White Shark is on the lift will be the collection of swabs (skin mucus, gill surface and cloacal swabs); collection of parasites, collection of semen, fecal, and muscle samples, as well as possibly urine samples if the animal urinates while on deck, and the collection of eye and tail measurements.

**Blood and tissue sampling** will be conducted while White Shark are onboard the vessel. A hypodermic puncture and biopsy punch will be used to obtain blood (<25ml), muscle (<5g), semen, and skin mucus samples.

**Implantation of internal acoustic tags** will be conducted by making a surgical incision to insert a sterilized transmitter (1cm x 6cm) into the coelomic cavity. The incision will be sutured and the sutures will be absorbed over a period of time. OCEARCH is proposing to insert the internal acoustic tags in every White Shark (up to 20) caught in Canadian waters under this permit application.

**Attachment of satellite tags** will be conducted by drilling and bolting Smart Position or Temperature (SPOT) tags on the leading edge of the first dorsal fin. The SPOT tags (Wildlife Computers Model SPOT-257) measure 162 x 57 x 20 mm and weigh 160 g. To attach the tag, four holes are drilled in the dorsal fin with an electric drill (drill bit will be cleaned and sterilized in alcohol before use). The tag will be attached with alcohol-sterilized nylon bolts, stainless locknuts and plastic spacers (standard hardware from the tag manufacturer). Tags will be coated with an antifouling compound. The hardware is designed to retain the tag for five years, after which it will fail and the tag will detach. OCEARCH is proposing to attach a SPOT tag to every White Shark (up to 20) caught in Canadian waters under this permit application.

Pop-up Satellite Archival Tags (PSAT) will be attached via a tether to a subdermal metal dart implanted in the shark's flank below the first dorsal fin. PSAT tags are provided to OCEARCH by a collaborator at the Woods Hole Oceanographic Institution. The number of tags has not been confirmed, but will likely be 4-6 tags. The PSAT tags will be attached, in addition to acoustic and SPOT tags, on 4-6 White Sharks.

OCEARCH is also potentially looking to use a prototype tag that is a combination of a PSAT and SPOT tag. The tag is attached via a darted tether in the same way as a PSAT tag. If these new prototype tags are available, they will be used instead of the PSAT tag on 4-6 White Sharks. As these are prototype tags, OCEARCH is proposing to use these tags in combination with the SPOT tags to validate the new tag's geolocation data.

**c) Analysis of Proposed Activities:**

<b>Location:</b> Atlantic Ocean  Coastal Nova Scotia: <ul style="list-style-type: none"> <li>• Mahone Bay (44° 29.50' N / 64° 13.50' W and adjacent areas</li> <li>• Bay of Fundy (44° 54.00' N / 66° 32.50' W and adjacent areas</li> </ul> South Coast of Newfoundland: <ul style="list-style-type: none"> <li>• Placentia Bay (47° 05.00' N / 54° 32.00' W</li> </ul> Sable Island (43° 56.14' N / 59° 56.59' W)				
<b>Dates:</b> September 18-October 11, 2018				
Proposed Activity	Planned Effects/Outcome		Potential Incidental Effects/Outcome	
	Prohibitions that Apply	Likelihood of the prohibited impact(s)	Prohibitions that Apply	Likelihood of the prohibited impact(s)
Actively attracting White Sharks to a vessel (i.e., chumming)	Harass	Med	Harm Kill	Low Low
Capture of White Sharks	Harass Harm Capture	High Low High	Kill	Low
Lifting White Sharks out of the water	Harass Harm Capture	High Low High	Kill	Low
Blood and tissue sampling	Harass Harm Possess	Med Low High	Harm	Low
Implantation of internal acoustic tags	Harass Harm	Med Low	Kill	Low
Attachment of satellite tags – SPOT tags	Harass Harm	Med Low	Kill	Low
Attachment of satellite tags – PSAT tags	Harass Harm	Med Low	Kill	Low

Impacts to individual White Sharks would result from any distress associated with the approaching vessel, being caught and brought onboard the vessel and out of the water, the application of the different tag types and the collection of biological samples.

**Actively attracting White Sharks to a vessel (i.e., chumming)**

A number of studies suggest that the presence of chum may be linked to modification of White Sharks' normal swimming and/or hunting behaviours, although the effects are likely short term when chum is used for short term research projects.<sup>1</sup> It is possible that attracting a White Shark will cause the individual to stray from patrolling for food or from mating. Disturbance to normal feeding behaviours may result in energetic costs.<sup>2</sup>

There is a possibility that attracting sharks to the fishing boat or the research vessel may result in collisions between the shark and the vessel and that the presence of the vessel may cause behavioural changes.

<sup>1</sup> NOAA. 2014. Draft Programmatic Environmental Assessment of Potential White Shark Research and Education Projects within the Gulf of the Farallones and Monterey Bay National Marine Sanctuaries. [https://nmssanctuaries.blob.core.windows.net/sanctuaries-prod/media/archive/library/pdfs/gfnms\\_draft\\_white\\_shark.pdf](https://nmssanctuaries.blob.core.windows.net/sanctuaries-prod/media/archive/library/pdfs/gfnms_draft_white_shark.pdf)

<sup>2</sup> Semmens, J.M., Payne, N.L., Huvaneers, C., Sims, D.W. & Bruce, B.D. 2013. Feeding requirements of White Sharks may be higher than originally thought. Sci. Rep. 3, 1471; DOI:10.1038/srep01471 (2013).

### **Catch of White Sharks**

Catch and release fishing is a source of stress to White Sharks due to the potential for long fight times (exhausting the individuals) and injury from wounds caused by the hooks. Long capture times have been known to kill bony fish and other sharks.<sup>3</sup> Physiological disruptions to fish result from the high anaerobic activity, muscle fatigue and time spent out of water caused by capture using most fishing techniques.<sup>4</sup>

Injury can result from the wound caused by the hook, although the extent of the tissue damage or injury will depend on the location of the hook and the type of gear. Sub-lethal injury can result from removing hooks or leaving them in place in the throat, esophagus or gut. In the short term, a hook in the mouth will cause a loss of blood, but the wound would be expected to heal within a year or less. Circle hooks are known to cause lower incidences of internal injury than conventional J hooks.<sup>5</sup>

Although not specific to White Shark, a study in Australia examined post release survival in Shortfin Mako by attracting individuals to a boat using chum, then using monofilament line and either J hooks or circle hooks to catch the sharks. The study showed that the length of the fight time did not impact survival. Circle hooks significantly reduced foul hooking. The study showed that hook choice affected the likelihood of mortality, while the species is able to cope with long fight times and associated physiological responses to capture due to its endothermy and high aerobic scope.<sup>6</sup>

It has been suggested that sharks, in general, are capable of recovery from physiological stress associated with capture and that any mortality is more likely linked to the extent of any physical injuries.<sup>7</sup>

### **Lifting White Sharks out of the water**

The research platform is raised and the White Sharks are lifted from their natural, in-water environment. This removal from the water likely results in physiological stress and possible oxygen deprivation.

Lifting White Sharks out of the water, onto a hard raised platform, may create excessive pressure on tissues and organs that usually do not bear weight. This impact may be greater in larger individuals.

While there are concerns about damage to internal organs, there is no evidence reported of internal organs being crushed when sharks are removed from the water.<sup>8</sup> However, if sharks are thrashing on the deck, this could lead to internal injuries.

OCEARCH has taken blood samples in the first minute and the last minute on the lift for 120 White Sharks handled in this manner and found stress levels remain relatively low throughout the handling time. Higher amounts of stress due to capture were shown in very young White Sharks (however OCEARCH is not proposing to catch young sharks in Canadian waters).

### **Blood and tissue sampling**

The *Canadian Council on Animal Care Guidelines on Care and Use of Fish in Research* suggest that blood samples be up to 1ml/kg body size. The volume proposed to be collected by this project is well under this recommended amount.

The retention of the blood and tissue samples involves possession of parts of individuals.

### **Implantation of internal acoustic tags**

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<sup>3</sup> NOAA 2014

<sup>4</sup> Skomal, G.B. 2007. Evaluating the physiological and physical consequences of capture on post-release survivorship in large pelagic fishes. *Fisheries Management and Ecology*. 14: 81-89.

<sup>5</sup> NOAA 2014

<sup>6</sup> French R.P., Lyle J., Tracey S., Currie S., Semmens J.M. 2015. High survivorship after catch-and-release fishing suggests physiological resilience in the endothermic shortfin mako shark (*Isurus oxyrinchus*). *Conserv Physiol* 3: doi:10.1093/conphys/cov044.

<sup>7</sup> Skomal 2007

<sup>8</sup> NOAA 2014



Implanting internal acoustic tags requires making a surgical incision, from which there could be a risk of infection or causing harm to the individual.

#### **Attachment of satellite tags (SPOT and PSAT)**

In terms of physical injury associated with the tagging, shark species in general are very resilient to superficial cuts and have a tremendous capacity to heal from injury.<sup>9</sup> Similar and much more extensive lacerations occur frequently during mating behaviours, and one of the identifying characteristics of a mature female shark is deep scarring along her dorsal musculature. The tagging site is expected to close over very quickly with minimal effect on the animal, as has been observed in other species held in captivity after tagging.

Various studies have examined possible longer term effects of electronic tags or data loggers on the swimming efficiency of sharks, but results have been variable.<sup>10</sup> There may be a marginally increased drag while swimming due to the external tag.

A study from South Africa suggests that SPOT tags can cause permanent cosmetic and structural damage to the dorsal fins of White Sharks, depending on how long the tag is attached for. Tags that detach within 12-24 months did not seem to cause long term damage; while after 24 months permanent damage to the dorsal fin was reported. However, the study did not show that the damage to the dorsal fin resulted in impacts to long term survival or body growth.<sup>11</sup>

Research from Monterey Bay Aquarium also showed that real-time satellite tags attached with multiple bolts on juvenile White Sharks affects the growth of the dorsal fin (growing around the tag or causing a deflection to the tip of the fin). They suggested that there may be more of a reaction to the presence of the bolts and tag in growing tissue.<sup>12</sup>

OCEARCH has provided photographs of White Sharks observed years after tagging that show that the fins have healed and are functioning properly.

#### **Post Release Behaviour and Longer Term Effects**

Results from research in which White Sharks were caught and restrained using an in-water stretcher and then tagged, has shown a six to 48-hour recovery period for individuals after capture and tagging.<sup>13</sup>

Post-release behavioural studies by OCEARCH collaborating scientists using accelerometers attached to the sharks have shown recovery and resumption of natural swimming behaviour within approximately 6 hours after release.

Research conducted off the west coast of California that involved tagging 21 White Sharks (2007-2012), found that they resumed 'normal' behaviours after tagging, as determined by their migration patterns. These sharks were tagged with SPOT tags (using various methodology including being lifted onto a platform out of the water and being tagged while alongside the research boat).<sup>14</sup>

It has been suggested that catch and release of marine pelagic fish may have sublethal population level effects due to reduced individual fitness. However, as these population level effects are difficult to assess in highly migratory species with poorly understood life histories, this has not been quantified or studied in depth.<sup>15</sup>

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<sup>9</sup> NOAA 2014

<sup>10</sup> Hammerschlag, N., 2011. A review of shark satellite tagging studies. J. Exp. Mar. Biol. Ecol. doi:10.1016/j.jembe.2010.12.012

<sup>11</sup> Jewell O.J.D., Wcisel M.A., Gennari E., Towner A.V., Bester M.N. 2011. Effects of Smart Position Only (SPOT) Tag Deployment on White Sharks *Carcharodon carcharias* in South Africa. PLoS ONE 6(11): e27242. doi:10.1371/journal.pone.0027242

<sup>12</sup> NOAA 2014

<sup>13</sup> NOAA 2014

<sup>14</sup> NOAA 2014

<sup>15</sup> Skomal 2007

As little is known about White Shark mating behaviour, it is unknown whether tagging could have an impact on mating.<sup>16</sup>

There is anecdotal evidence of at least one White Shark having died following interactions with OCEARCH using the methods proposed here.

#### **Summary**

Based on the above assessment, the following activities have the potential to contravene the SARA prohibitions and therefore must be authorized under SARA:

- Actively attracting White Sharks to a vessel;
- Catch and release of White Sharks and lifting individuals out of the water on a hydraulic lift;
- Collecting biological samples from White Sharks;
- Implanting internal acoustic tags; and
- Attaching SPOT and PSAT tags to White Sharks.

The effects that these activities may cause to White Sharks include:

- Capture and harassment of, and potentially harm to, individuals,
- Possession of samples from individuals, and
- Although unlikely, killing of, individuals.

The Species at Risk Management Division has concluded that the activities associated with the above project are likely to affect the **White Shark, Atlantic population**, in a manner that is prohibited by SARA, and therefore a SARA Section 73 permit is considered necessary to engage in the proposed activities.

### **3. REGULATORY ASSESSMENT OF APPLICATION**

#### **Necessity Assessment**

Work through the following five questions to determine the appropriate action for DFO to take in response to the permit application.

1. Is it likely that one or more species listed on Schedule 1 of the SARA occurs at any of the locations identified for the proposed activities?

☒ Yes ..... **Go to next question**  
☐ No .....

**A SARA permit is not necessary. The applicant will be informed in writing and advised to ensure any other required authorizations are obtained before proceeding with the activities. Go to Assessment Summary.**

2. Are any of the SARA-listed species concerned considered an "Aquatic Species" as per the definition in the *Fisheries Act*?

☒ Yes ..... **Go to next question**  
☐ No .....

**The applicant will be directed to resubmit the application to the appropriate agency. Go to Assessment Summary.**

3. Are the locations at which any of the activities are proposed to take place under the jurisdiction of Fisheries and Oceans Canada?

☒ Yes ..... **Go to next question**  
☐ No .....

<sup>16</sup> NOAA 2014

**The applicant will be directed to resubmit application to the appropriate agency. Go to Assessment Summary.**

4. Is it certain or likely that performing any of the proposed activities will affect the SARA-listed species concerned in a way to contravene the general prohibitions of SARA (subsections 32(1), 32(2), section 33, subsections 36(1), 58(1), 60(1) and 61(1))?

☒ Yes ..... **Go to next question**  
☐ No .....

**A SARA permit is not necessary. The applicant will be advised of this in writing. Go to Assessment Summary.**

5. Do any of the exceptions listed in SARA Section 83 apply to the proposed activities concerned?

☐ Yes .....

**A SARA permit is not necessary. The applicant will be advised of this in writing and the basis on which an exception applies will be described here. Go to Assessment Summary.**

☒ No .....

**A SARA Section 73 permit is required to avoid contravention of the prohibitions of SARA. DFO will proceed with the application to assess eligibility. Go to Eligibility Assessment.**

#### **Eligibility Assessment**

The following two questions assess whether the proposed activities are eligible for a SARA Section 73 permit.

**1. Section 73(2):** The purpose of the proposed activities is described by *one or more* of the following:

☒ The activity is scientific research relating to the conservation of SARA-listed species and will be conducted by qualified persons

☐ The activity benefits the species or is required to enhance its chance of survival in the wild.

☐ Affecting the SARA-listed species is incidental to carrying out the activity

The proposed activities aim to answer a number of research questions, both through the tracking of individual White Sharks that will be tagged and through analysis on blood and other tissue samples.

The draft Recovery Strategy for White Shark identifies the following as high priority research and management approaches:

- undertake scientific research to better understand population dynamics, distribution and habitat use.
- collect and maintain White Shark sightings information; maintain this information in a database and share via network

OCEARCH's Chief Science Advisor is Dr. Robert Hueter. He is the Director of the Center for Shark Research at the Mote Marine Laboratory and has more than 25 years experience in shark research.

☒ Yes ..... **Go to next question**

☐ No .....

**The proposed activities are not eligible for a SARA Section 73 Permit. Go to Assessment Summary.**

**2. Section 73(3):** The proposed activities meet *all* of the following pre-conditions:

- ☒ All reasonable alternatives to the activity that would reduce the impact on the species have been considered and the best solution has been adopted

In the consideration of alternatives to the proposed research, there are a number of alternatives that should be considered. The first alternative to consider would be to not undertake the activity and not conduct the research; however, given the many unknowns about the species this would not represent the best solution as it would be a loss of an opportunity to learn more.

There are no alternative locations to conduct the research, as it must be conducted within the range of the species.

In relation to the proposed activities, overall the applicant asserts that the methods and procedures proposed are the safest and most successful way of obtaining the necessary samples and attaching SPOT tags.

#### **Attracting and Catching White Shark**

- The alternative to chumming for White Shark is to not use chum, which would limit the ability to sight White Sharks to passive observations. Given the low numbers in a large area, chance encounters would be low, which would reduce or even eliminate the success rate of researchers attempting to deploy tags or obtain samples.

#### **Catching, restraining and lifting the shark out of the water**

- Alternative approaches include (1) attracting a shark and sampling/tagging it without restraining or catching it and (2) attracting a shark and catching it, but conducting sampling/attaching tags while the shark remains in the water.
- The following summarizes the type of tagging and sampling that is possible under each alternative:

	(1) No Capture	(2) Capture and Tag In Water	(3) Capture and Use of Lift
Tag Types	PSAT Acoustic (external)	SPOT PSAT Acoustic (external)	SPOT PSAT Acoustic (internal or external)
Other Samples	- muscle samples	- blood samples - swabs (skin mucus) - muscle samples	- blood samples - swabs (skin mucus, gill surface and cloacal swabs) - muscle samples - parasite samples - semen samples - fecal samples - urine samples (opportunistic) - eye/tail measurements - ultrasound

- Under alternative (1), the success rate for tagging and collecting samples would likely be less than using one of the alternative methodologies, which involve catching the sharks. This approach can also require chasing the individuals with a small to mid-sized boat, which can increase stress levels. There is a risk with this approach that tags would not be attached properly.
- Under alternative (2), some researchers have suggested that keeping the shark in the water reduces the stress experienced by the shark as a result of being lifted from the water. However, OCEARCH has indicated that sharks are more likely to struggle if they remain in the water, while being on the lift quiets the animals and therefore they conclude that the proposed method reduces the potential for harm to the sharks. Sampling and tagging using an alongside-boat method requires calm sea conditions, which are often not encountered. Working alongside a boat with a large animal that is likely to be struggling also increases the risk to researchers.
- With respect to the precise methodology proposed to capture sharks, the approaches proposed

likely present the best alternative to reduce potential impacts. Alternatives would be to use a 'J' hook instead of a circle hook, to not use the bite blocker, to not embed the leaders in rope. However, all of these alternatives would increase the risk of internal (e.g., gut-hooking) or external (e.g., lacerations) injury to the sharks.

#### **Blood and tissue sampling**

- An alternative method to collecting biological samples, would be collect samples by harpoon, while the shark remains in the water. However, the collection of blood samples, swabs of the skin mucus, gill surface and cloacal, parasite collection and semen samples require catching and controlling the animal. Further, attempting to obtain samples in the water increases the risk of sample contamination, loss of sample and infections in the shark. Muscle samples are taken from the site of the PSAT tag attachment reducing sample wounds on the shark.

#### **Tagging**

- SPOT, PSAT and acoustic tags all collect different types of data:
  - SPOT tags transmit location and other data in real time. Information is transmitted while the tag is attached to the shark; the data signal from these tags is sent when the shark's dorsal fin is at the surface. SPOT tags may transmit data for up to 3-5 years. To obtain real-time geolocation data from an animal that is wide ranging within areas that are previously unknown, SPOT tags provide the best option for collecting this data.
  - Data from PSAT tags is stored on the device and retrieved after the tag detaches from the shark. PSAT tags will collect data for approximately one year. PSAT tags provide archived temperature and depth data, but the geolocation data is less precise and not available in real-time.
  - Acoustic tags are useful to detect the arrival of an animal in an area where underwater acoustic receivers have been deployed (typically well-studied inshore areas). These tags provide fine-scale geolocation data, but only in areas where there are acoustic receivers.
- OCEARCH has indicated that to understand an animal's large scale movements and migration, SPOT tags are the most effective in revealing the precise tracks and this data, in their perspective, cannot be substituted with data from PSAT or acoustic tags. Further, the real time data from SPOT tags support their educational and outreach objectives.
- There are alternative attachment methodologies for tags:
  - Acoustic tags can be attached externally rather than internally. While some researchers have successfully utilized externally attached acoustic tags, OCEARCH has indicated that there are concerns with the risk that external tags can be shed. In addition, internal tags have been shown to transmit for up to 5 years (and even up to 10 years), while external tags have a shorter lifespan of approximately 1 year. OCEARCH has further indicated that the internal tags do not cause on-going harm to sharks once implanted.
  - SPOT tags can also be attached as floating tags, however OCEARCH indicated concern that floating SPOT tags can be fouled, shed and lost from the animal very rapidly.
  - Other researchers have developed a technique to attach SPOT tags with a single bolt, rather than the four bolt attachment methodology proposed by OCEARCH. OCEARCH has indicated that their information indicates that the single bolt attachment has a shorter lifespan, limiting the data that can be collected. Additionally, the single bolt attachment requires a saddle in which the tag is placed when attached; this saddle may decrease hydrodynamics for the sharks on an on-going basis.

- ☒ All feasible measures will be taken to minimize the impact of the activity on the species or its critical habitat or the residence of its individuals

The following measures were proposed by OCEARCH to minimize the impacts of the activities:

- individuals will not be chased by the vessel, but will be attracted using chum;
- gear will be used that will minimize the chance that animals are gut-hooked (including using circle hooks and a crossbar bite-blocker);
- animal struggles and injury will be minimized by:

- using a leader attached to a braid rope with elasticity properties to help reduce hard shock during the initial struggle;
  - using a 10m leader length in case the shark rolls in the line to ensure that the shark cannot bite through the rope and escape (retaining the hook and leader);
  - embedding the leader inside a three-strand rope to give it a thicker diameter so that if the shark rolls, the thicker rope does not cut into the sharks' skin and is easier to unwrap;
  - using heavier tackle that keeps enough pressure on the shark so that the line is stretched tight and the shark cannot turn and roll.
- all research procedures will be conducted within 20 minutes;
- while on the research platform:
  - oxygenated seawater will be pumped through a hose and mouthpiece (allowing for simultaneous flushing of the gills on both sides of the head) into the shark's buccal cavity at all times;
  - a tail rope will be used to prevent the animal from causing harm to itself and others;
  - the head and eyes will be covered with wet terrycloth towel to reduce stress and keep eyes moist;
  - skin will be kept wet during in-air procedures to prevent drying;
  - animal stress will be monitored by observing skin colouration, presence of blood pooling, gill movements, and animal activity:
    - if stress is detected in the animal, a blood sample will be taken to evaluate the shark's conditions;
    - if acute stress is observed, the animal will be released immediately.
- OCEARCH is currently seeking approval of their animal care plan from Jacksonville University and will notify DFO once that the approved plan is in place.

In addition, the permit will require that:

- the total time of engagement with a single White Shark be limited to 40 minutes (from the time it is initially hooked until it is released);
- a maximum number of 20 White Sharks can be tagged;
- as the impact on fin development of attaching SPOT tags has been shown to be greater in juvenile sharks<sup>17</sup>, only White Sharks greater than 3.5 metres in total length can be caught and tagged;
- a DFO Scientist or Observer or other representative must be onboard during a subset of the expedition, as determined by DFO;
- work will cease and DFO will be contacted immediately if there is any mortality of a White Shark or if a White Shark receives any significant injury and no further attempts at catching or tagging White Sharks will be resumed until approved by DFO;
- all interactions with White Sharks (including location of capture/tagging events; number and gender/age of all White Sharks caught and tagged) and all mitigation measures employed will be reported to DFO. In addition, unsuccessful tagging attempts, in which White Sharks were observed but not caught or tagged, will also be reported to DFO (location, length estimate, gender (if visible), weight).

☒ The activity will not jeopardize the survival or recovery of the species

Tagging of White Sharks is unlikely to jeopardize the survival or recovery of the population. The recovery goal in the draft recovery strategy is to: "Maintain or increase the population of White Sharks that frequent Atlantic Canadian waters." No mortality is expected as a result of the activities, and therefore recovery will not be compromised. Even in the very unlikely event that mortality occurs during the activities, Science advice indicates that the population of White Sharks in the NW Atlantic is increasing and current mortality levels (due to incidental capture in fisheries) would have to increase substantially before population trajectories would be predicted to decline. Therefore there is a high likelihood that

<sup>17</sup> Jewell et al. 2011

recovery goals can be achieved under various scenarios of allowable harm for White Shark, even if annual bycatch mortality increases from historical estimates.<sup>18</sup>

- ☒ Yes ..... **Go to Consultation Assessment**  
☐ No .....

**The proposed activities are not eligible for a SARA Section 73 Permit. Go to Assessment Summary.**

### **Consultation Assessment**

The following two questions assess whether consultation with an outside party is required before issuing a SARA Section 73 Permit for the proposed activities:

1. **Section 73(4):** Do the proposed activities concern a species in an area in respect of which a wildlife management board is authorized by a land claims agreement to perform functions in respect of wildlife species?

☐ Yes ..... **Go to Assessment Summary**  
☒ No ..... **Go to next question**

2. **Section 74(5):** Do the proposed activities concern a species in a reserve or any other lands that are set apart for the use and benefit of a band under the Indian Act?

☐ Yes ..... **Go to Assessment Summary**  
☒ No ..... **Go to Assessment Summary**

### **Assessment Summary**

The above assessment is summarized below. In order to recommend that a SARA Section 73 Permit be issued for the proposed activities, the above assessment must demonstrate that doing so is warranted, lawful, and if applicable, that all consultation requirements of SARA s. 73(4) or 73(5) have been fulfilled.

1. The proposed activities warrant the need for a SARA Section 73 Permit.

☒ Yes ..... **Go to next question**  
☐ No .....

**A SARA permit is not necessary. The applicant will be advised of this in writing. Go to EM Permit Decision.**

2. The proposed activities are consistent with all of the eligibility requirements of SARA Section 73.

☒ Yes ..... **Go to next question**  
☐ No .....

**The proposed activities are not eligible for a SARA s.73 Permit. Go to EM Permit Decision.**

3. The permit decision, proposed activities, and any permit contents require consultation with an outside party.

☐ Yes .....  
**Undergo consultation with the appropriate party before proceeding further in the permitting process.**

☒ No .....  
**Issue a SARA s.73 Permit. Go to Ecosystem Management Permit Decision.**

<sup>18</sup> DFO. 2017. Evaluation of Scope for Harm for White Shark (*Carcharodon carcharias*) in Atlantic Canada. DFO Can. Sci. Advis. Sec. Sci. Resp. 2017/025.

#### 4. REVIEW

Input sought from:

Name	DFO Sector
Aimee Gromack	DFO Maritimes - SARMD
Heather Bowlby / Warren Joyce	DFO Maritimes - Science
Darrin Sooley	DFO Newfoundland and Labrador - SARMD

#### 5. ECOSYSTEM MANAGEMENT PERMIT DECISION

☐ A SARA Section 73 Permit is not considered necessary to engage in the proposed activities.

☒ Issue SARA Section 73 Permit subject to the conditions outlined in the SARA Section 73 Permit for DFO-MAR-2017-17.

☐ Do not issue Section 73 Permit.

#### 6. SIGN-OFF

Reviewed by:

  
Donald Humphrey  
Regional Manager  
Species at Risk Management Division (Maritimes  
Region)

30/04/2018  
Date



## MacDonald, Jennifer

---

**From:** MacDonald, Jennifer  
**Sent:** April-30-18 8:53 AM  
**To:** Forsey, Sue  
**Subject:** RE: OCEARCH permit

Ok, we don't usually worry about putting two different dates, but we can do so. Why don't we put August 1, so that they have a bit of latitude in case their dates change slightly.

Jenn

**Jennifer MacDonald**  
Species at Risk Management Division  
(902) 407-8175

---

**From:** Forsey, Sue  
**Sent:** April-30-18 8:44 AM  
**To:** MacDonald, Jennifer  
**Subject:** RE: OCEARCH permit

Monday already? ☺

I was asking because we put in the date that's requested in the application as the start date, and then sometimes have a different issue date when the permit is issued earlier. I was planning to put the Sept date as the start date, but today's as the date of issue. If anything changes for them, then the date could be amended.

Sue

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**From:** MacDonald, Jennifer  
**Sent:** April-30-18 8:30 AM  
**To:** Forsey, Sue  
**Subject:** RE: OCEARCH permit

Morning Sue,  
I think we usually just stamp the day that it's signed as the start date.  
Jenn

**Jennifer MacDonald**  
Species at Risk Management Division  
(902) 407-8175

---

**From:** Forsey, Sue  
**Sent:** April-27-18 11:25 AM  
**To:** MacDonald, Jennifer  
**Subject:** RE: OCEARCH permit

Hi Jenn,

What are you putting in as the start date for the permit to be valid? Is it their proposed start date (Sept 12)?

Thanks.

Sue

---

**From:** MacDonald, Jennifer  
**Sent:** April-27-18 8:49 AM  
**To:** Forsey, Sue  
**Subject:** OCEARCH permit

Hi Sue,

I've attached the final version of the permit with Donald's comments. He had very few changes; a couple of small wording changes to condition 2.9 and 2.10 were the only changes.

[REDACTED] will be printing this out for Donald's signature Monday. Once you have the signed Nfld permit, do you want to send me a scanned copy and I will send both to OCEARCH at the same time. Our 90 day timeline expires Tuesday, so if possible for Helen to sign off by then, that would be great!

Thanks!

Jenn

**Jennifer MacDonald**

Species at Risk Biologist | Biologiste des espèces en péril

Species at Risk Management Division | Division de la gestion des espèces en péril

Ecosystem Management | Gestion des écosystèmes

Fisheries & Oceans Canada | Pêches & Océans Canada

P.O. Box 1006 Dartmouth N.S. | C.P. 1006 Dartmouth N.E. B2Y 4A2

Tel | Tél: (902) 407-8175 Fax | Téléc: (902) 426-2331

Email | Courriel: [jennifer.macdonald@dfo-mpo.gc.ca](mailto:jennifer.macdonald@dfo-mpo.gc.ca)

## MacDonald, Jennifer

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**From:** Forsey, Sue  
**Sent:** April-30-18 12:40 PM  
**To:** MacDonald, Jennifer  
**Cc:** Sullivan, Katrina  
**Subject:** RE: OCEARCH permit  
**Attachments:** scanned permit DFO-NLSAR-001-18.pdf; Permit Report Form (updated 2018) NL version.docx

**PATH SAPH NO:** 17-PMAR-00018

Hi Jenn,

Here's the scanned copy of the signed permit for NL Region. I've also attached a copy of your permit report with the NL contact info included to go along with our permit.

Let me know if there's anything else you need.

Thanks.

Sue

---

**From:** MacDonald, Jennifer  
**Sent:** April-27-18 8:49 AM  
**To:** Forsey, Sue  
**Subject:** OCEARCH permit

Hi Sue,

I've attached the final version of the permit with Donald's comments. He had very few changes; a couple of small wording changes to condition 2.9 and 2.10 were the only changes.

[REDACTED] will be printing this out for Donald's signature Monday. Once you have the signed Nfld permit, do you want to send me a scanned copy and I will send both to OCEARCH at the same time. Our 90 day timeline expires Tuesday, so if possible for Helen to sign off by then, that would be great!

Thanks!

Jenn

### Jennifer MacDonald

Species at Risk Biologist | Biologiste des espèces en péril  
Species at Risk Management Division | Division de la gestion des espèces en péril  
Ecosystem Management | Gestion des écosystèmes  
Fisheries & Oceans Canada | Pêches & Océans Canada  
P.O. Box 1006 Dartmouth N.S. | C.P. 1006 Dartmouth N.E. B2Y 4A2  
Tel | Tél: (902) 407-8175 Fax | Téléc: (902) 426-2331  
Email | Courriel: [jennifer.macdonald@dfo-mpo.gc.ca](mailto:jennifer.macdonald@dfo-mpo.gc.ca)



Fisheries and Oceans Pêches et Océans  
Canada Canada

## PERMIT ISSUED UNDER SECTION 73 OF THE *SPECIES AT RISK ACT*

Subject to the conditions described in this permit, the holder of this permit ("Permit Holder"), or any qualified person acting under the authority of the Permit Holder, is authorized under the authority of subsection 73(1) of the *Species at Risk Act*, S.C. 2002, c.29 (SARA) to engage in activities (as described in this permit) that **harm, harass, capture, and possess** individuals of the following threatened or endangered aquatic species listed on Schedule 1 of SARA:

**White Shark** (*Carcharodon carcharias*), Atlantic population

### Permit issued to:

Name: OCEARCH ("Permit Holder"):  
Attention to: George Christopher Fischer  
Address: 1790 Bonanza Drive, Suite 101B  
Park City, Utah, USA 84060  
Email: [chris@oceanarch.org](mailto:chris@oceanarch.org)  
Phone: (435) 645-8990 (office) [REDACTED] (cellular)

The following individual operating under the authority of Fisheries and Oceans Canada (DFO) as "Permit Holder", and those under his supervision, may undertake the activities authorized by this permit:

Name	Organization
Robert Hueter	Mote Marine Laboratory

### Location of Proposed Activity

**This permit is only valid at the following location(s):**

Nearest community (city, town, village): N/A

Municipality, district, township, county: N/A

Province: N/A

Name of watercourse(s), waterbody(ies): **Atlantic Ocean**

Specific location: South coast of Newfoundland including: Placentia Bay (47° 05.00' N / 54° 32.00' W)

### Valid Permit Period

This permit is valid from 2018-08-01 until 2018-11-30.

If the Permit Holder cannot complete the activity during this period, Fisheries and Oceans Canada (DFO) must be notified in advance of the expiration of the time period, as soon as the Permit Holder is aware.

The period during which other conditions of this permit must be complied with are provided in their respective sections below. DFO may, where appropriate, amend this permit. In cases where the Valid Permit Period is extended, written notice and/or an amended permit will be provided to the Permit Holder.

Canada

.../2

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### Description of the Activity

The purpose of the activity is to conduct scientific research on White Sharks in Canadian waters to gain a better understanding of the role of Canadian waters in the life history of the White Shark population in the northwest Atlantic Ocean, the range of the species within Canadian waters and health of White Sharks. The researchers will attach acoustic and satellite tags, as well as collect various biological samples, from up to 20 sharks in Canadian waters.

The study area includes:

- South coast of Newfoundland including Placentia Bay (47° 05.00' N / 54° 32.00' W)

Researchers will use chum to attract White Sharks in the study area to the fishing boat and larger research vessel. When a White Shark is sighted, either visually or using a drone, the fishing boat will target its fishing activities to attract and capture that shark. Chum bags, chum boxes, bait tanks, chum tubes and decoys may all be used to attract White Sharks to the fishing vessel. Once a White Shark is in the vicinity of the fishing vessel, the researchers will attempt to catch the shark using a 20/0 circle hook (zero offset) with a bite-blocker attached. In the case of a very large White Shark, a 27/0 circle hook (zero offset) with a buoy to prevent swallowing of the hook will be used. Once caught, the White Shark will be guided onboard the hydraulic lift on the research vessel, which will then be raised above the waterline. While on the lift, sharks will be provided with oxygenated seawater via a mouthpiece and tube.

Once on the lift, internal acoustic tags will be implanted surgically in the coelomic cavity and the incision will be sutured. Smart Position and Temperature (SPOT) tags will be attached on the leading edge of the first dorsal fin by drilling four holes in the dorsal fin with an electric drill and attaching the tag with nylon bolts, stainless steel locknuts and plastic spacers. The hardware is designed to retain the tag for five years after which it will fail and the tag will detach. All White Sharks caught, up to 20, will have both acoustic and SPOT tags applied. Pop-up Archival Satellite Tags (PSAT) will be attached via a tether to a subdermal metal dart implanted in the shark's flank below the first dorsal fin. PSAT tags will be attached to up to 6 White Sharks caught.

The researchers will also collect samples (blood, muscle, semen, fecal and urine samples), conduct skin, gill and cloacal swabs, collect parasites, collect eye and tail measurements, and perform an ultrasound (females). Samples will be collected using a hypodermic puncture and biopsy punch.

The activities authorized by this permit consist of:

- Actively attracting White Sharks to a vessel;
- Catch and release of White Sharks;
- Lifting individuals out of the water on a hydraulic lift;
- Collecting blood and tissue samples;
- Implanting internal acoustic tags; and
- Attaching SPOT and PSAT tags.

The effects that the activity may cause to the listed wildlife species and the effects of those changes authorized by this permit are as follows:

- Harm, harassment, capture and possession of listed aquatic species at risk.

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## Terms and Conditions of Permit

The activity must be carried on in accordance with the following conditions:

### 1. General Conditions

- 1.1. A copy of this permit shall be kept on site at all times in the possession of the Permit Holder or a person acting under the Permit Holder's authority, and shall be made available to an enforcement officer upon request.
- 1.2. All persons undertaking the activity under the authority of the Permit Holder shall do so under the direction and oversight of the Permit Holder and shall be made familiar with the conditions of this permit.
- 1.3. The activity must comply with the conditions identified within this permit. Activities that affect individuals of species at risk, their residences, or their critical habitat, other than those specifically identified within this permit are not authorized under this permit.
- 1.4. No changes to the Permitted activities shall take place without prior consultation with DFO, and written approval from DFO, Species at Risk Management Division. Contact information as follows:

**Species at Risk Management Division**  
**Fisheries and Oceans Canada**  
**80 East White Hills Road**  
**PO Box 5667**  
**St. John's, NL, A1C 5X1**  
**email: [SARANL-LEPTNL@dfo-mpo.gc.ca](mailto:SARANL-LEPTNL@dfo-mpo.gc.ca)**  
**phone: 1-709-772-2443 fax: 1-709-772-5562**

### 2. Conditions to avoid or minimize the impact of the activity on the species:

- 2.1. To the extent possible, activities shall be conducted in a manner whereby any individuals of the species shall be handled only in the circumstances authorized under this permit and with the least amount of harm.
- 2.2. Activities shall only be conducted in the study area described above. If activities are to be conducted outside the study area, DFO shall be notified in advance using the contact information in condition 1.4.
- 2.3. Only individuals that are experienced in tagging large pelagic fishes shall tag White Sharks.
- 2.4. White Sharks shall not be chased by the vessel.
- 2.5. The following gear shall be used: circle hooks (either 20/0 or 27/0 with zero offset) rigged with a cross bar bit-blocker (30cm up the leader) and attached to a stainless steel wire rope (3/32" or 1/8"). The leader shall be 10m in length and shall be attached to a braid rope with elasticity properties. Leaders shall be embedded inside a three-strand rope to increase the diameter.
- 2.6. Individual White Sharks shall not be kept on the research platform for longer than 20 minutes.
- 2.7. While on the research platform, oxygenated seawater shall be pumped through a hose and mouthpiece into the shark's buccal cavity at all times.
- 2.8. While on the research platform, a tail rope shall be used to prevent the animal from causing harm to itself and others.
- 2.9. While on the research platform, the animal's head and eyes shall be covered with wet towel to reduce animal stress and keep eyes moist.
- 2.10. While on the research platform, the animal's skin shall be kept wet.
- 2.11. While on the research platform animal stress shall be monitored by observing skin colouration, presence of blood pooling, gill movements, and animal activity. If acute stress is observed, the animal shall be released immediately.
- 2.12. The total time of engagement with a single White Shark from the time it is initially hooked until it is released shall be limited to 40 minutes.
- 2.13. No more than 20 White Sharks, in total, shall be tagged.
- 2.14. No attempts shall be made to tag White Sharks that are injured or behaving abnormally.
- 2.15. Only White Sharks greater than 3.5 metres in total length shall be caught and tagged.

- 2.16. A DFO representative shall be onboard as an observer during a subset of the expedition to be determined by DFO.
- 2.17. In the event of a mortality or significant injury being sustained by a White Shark during a tagging attempt, all further attempts at tagging shall cease and DFO shall be contacted immediately using the contact information in condition 1.4. No further attempts at catching or tagging White Sharks shall be resumed until approved by DFO.

**3. Conditions that relate to monitoring and reporting:**

- 3.1. By December 31, 2018, irrespective of whether the Permitted activities took place, a SARA Section 73 Permit Report shall be completed and returned to the Species at Risk Management Division using the contact information provided in condition 1.4. Without limiting the generality of the foregoing, the report shall contain the following information, to the satisfaction of DFO in its sole discretion:
  - 3.1.1. to demonstrate that measures and standards to avoid and mitigate the impacts of the permitted activities on the species were implemented according to the conditions of this permit;
  - 3.1.2. an assessment of whether the measures and standards mentioned in condition 3.1.1 were successful at avoiding and mitigating the impacts of the permitted activities on the species;
  - 3.1.3. details of any contingency measures that were followed to prevent impacts greater than those authorized by this permit;
  - 3.1.4. for any interaction with, or sighting of, a White Shark, report the following: date, time, location, length, size, gender (specify if females are pregnant or not), condition of the individual; and identify if tagging was attempted or undertaken on that individual; and
  - 3.1.5. provide details of any tagging attempts, including whether tagging was successful, unplanned or unexpected impacts on the shark, reaction of the shark to the tagging, and lessons learned.

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**Authorization Limitations and Application Conditions**

This permit cannot be transferred or assigned to another party. If the activity authorized under this permit is sold or transferred to another party, or if other circumstances arise that result in another party taking over the activity, the Permit Holder shall advise DFO in advance if the ownership or responsibility for the activity is expected to change.

The failure to comply with any condition of this permit is an offence under section 97 of SARA and might result in charges being laid under SARA.

This permit may be revoked or amended to ensure the survival or recovery of White Shark. Without limiting the generality of the foregoing, DFO may:

- suspend any permitted activities to avoid or mitigate additional adverse direct or indirect effects to White Sharks;
- amend or revoke this permit; and
- direct the Permit Holder to carry out at the Permit Holder's expense any modifications or actions deemed necessary by DFO to avoid or mitigate existing impacts or to avoid further adverse direct and indirect impacts to White Sharks.

This permit is valid only with activities and species listed herein and for no other purposes. It does not authorize the Permit Holder to kill, buy, sell, or trade an individual of a wildlife species that is listed as extirpated, endangered or threatened, or any part or derivative of such an individual. This permit does not purport to release the Permit Holder from any obligation to obtain permission from or to comply with the requirements of any other regulatory agencies.

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Date of Issue: 2018-04-30

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Signature of authorizing officer:



Helen Griffiths

Regional Manager, Species at Risk  
Newfoundland and Labrador Region  
Fisheries and Oceans Canada

80 East White Hills Road, PO Box 5667, St. John's NL A1C 5X1

Further information about this permit is available from the above authorizing officer ([Helen.Griffiths@dfo-mpo.gc.ca](mailto:Helen.Griffiths@dfo-mpo.gc.ca)).

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## SARA Section 73 Permit Report

### SECTION A: PERMIT INFORMATION

REPORTING YEAR:		PERMIT/LICENCE#:	
PERMIT HOLDER NAME:		PERMIT HOLDER ORGANIZATION:	
PERMIT ISSUANCE DATE:		PERMIT EXPIRY DATE:	

### SECTION B: PROJECT STATUS

PROJECT STATUS: ☐ COMPLETED ☐ CONTINUING ☐ SUSPENDED ☐ TERMINATED

PROPOSED END DATE OF PROJECT: Click here to enter a date.

WILL A PERMIT RENEWAL BE REQUESTED IN THE FUTURE? ☐ YES ☐ NO ☐ NOT SURE

IF YES, FOR WHAT YEAR(S)	
--------------------------	--

WERE ANY OF THE ACTIVITIES AUTHORIZED BY THIS PERMIT PERFORMED WITHIN THE EFFECTIVE DATES OF THE PERMIT? ☐ YES ☐ NO

IF YES, COMPLETE ALL RELEVANT SECTIONS OF THIS REPORT.

IF NO, EXPLAIN WHY, USING THE SPACE BELOW, AND GO TO SECTION G OF THIS REPORT.

--

***INSTRUCTIONS: PLEASE COMPLETE SECTIONS C TO F BELOW. ADDITIONAL INFORMATION CAN BE PROVIDED IN A SEPARATE DOCUMENT USING SECTION HEADINGS CORRESPONDING TO THOSE BELOW IF NECESSARY.***

### SECTION C: REPORT OF ACTIVITIES

Describe each activity, authorized by the SARA Section 73 Permit, that was undertaken. Provide details on who performed the activity, when it took place, where it took place, what methods and equipment were used, and whether or not performing the activity resulted in an interaction with the SARA-listed species. For any activities resulting in one or more interactions with the SARA-listed species, indicate the specific Record(s) of Interaction to refer to in Section D.

--

#### SECTION D: RECORD OF INTERACTIONS

Provide all records and information pertaining to any interactions with the SARA-listed species, as specified and required by the conditions of the SARA Section 73 Permit.

#### SECTION E: OTHER REQUIRED SUBMISSIONS

Provide any additional information or materials pertaining to the project as specified and required by the conditions of the SARA Section 73 Permit or, if none is required, check the box below:

☐ THE SUBMISSION OF OTHER INFORMATION OR MATERIALS IS NOT REQUIRED BY THE TERMS OF THE PERMIT

#### SECTION F: OPTIONAL SUBMISSIONS

Provide any additional information or materials to share with Fisheries and Oceans Canada pertaining to your work or the SARA Section 73 Permit. This may include any additional information or findings, future plans with respect to work involving or affecting SARA-listed species, any challenges the conditions of the permit presented in completing the planned activities and/or any suggestions for additional or alternative measures that could be taken in the future to minimize the impact of the activity on the species. If no information will be provided, check the box below:

☐ I HAVE NO ADDITIONAL INFORMATION OR MATERIALS THAT I WISH TO SUBMIT

#### SECTION G: SUBMIT COMPLETED REPORT

SUBMIT YOUR COMPLETED REPORT AND ALL REQUIRED ATTACHMENTS ANNUALLY ON OR BEFORE THE DATE STIPULATED IN YOUR PERMIT.

**BY MAIL:** Fisheries and Oceans Canada  
Species at Risk Management Division

**BY EMAIL:** [SARANL-LEPTNL@dfo-mpo.gc.ca](mailto:SARANL-LEPTNL@dfo-mpo.gc.ca)

PO Box 5667  
St. John's, NL A1C 5X1  
Canada

**BY FAX:** 709-772-5562

REPORT COMPLETED BY (*Print Name*):

SIGNATURE:

DATE COMPLETED: Click here to enter a date.

#### **SECTION H: PRIVACY NOTICE STATEMENT**

The information you provide in relation to this form is collected under the authority of the *Species at Risk Act* for the purpose of permit reporting. The information may be used for evaluation and compliance. You have the right to the correction of, access to, and protection of, your personal information under the *Privacy Act* and to file a complaint with the Privacy Commissioner of Canada over Fisheries and Oceans Canada's handling of your information. Personal information collected through the permitting process is described in the Personal Information Bank number DFO PPU 770 and can be accessed and assessed for accuracy. For more information, visit [http://www.inter.dfo-mpo.gc.ca/atip/infosource\\_e/pib-e/Species\\_at\\_Risk\\_Act\\_Permit-e](http://www.inter.dfo-mpo.gc.ca/atip/infosource_e/pib-e/Species_at_Risk_Act_Permit-e). Info Source is a series of publications containing information about and/or collected by the Government of Canada.

## MacDonald, Jennifer

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**From:** MacDonald, Jennifer  
**Sent:** April-30-18 2:44 PM  
**To:** 'Robert Hueter'; Chris Fischer  
**Cc:** Humphrey, Donald; Sullivan, Katrina; Forsey, Sue  
**Subject:** SARA Section 73 Permit - White Shark Tagging  
**Attachments:** Permit Report Form (updated 2018).docx; Permit Report Form (updated 2018) NL version.docx; OCEARCH-Signed Permit\_Maritimes Region.pdf; scanned permit DFO-NLSAR-001-18.pdf

Hello Bob and Chris,

I have attached the *Species at Risk Act* Section 73 Permits authorizing activities affecting White Shark in the waters off Nova Scotia and Newfoundland and Labrador respectively. Copies of the signed permits should be kept at the work site(s) at all times. Please read the permits to ensure that you are familiar with all of the conditions including the information that must be collected and recorded, as well as the circumstances where there is a requirement to provide notification to Fisheries and Oceans Canada.

I have also attached SARA Permit Report Forms (for Maritimes and Newfoundland and Labrador respectively). You are required to submit a completed SARA Permit Report by December 31<sup>st</sup>, 2018.

Please confirm that you have received this email. Feel free to contact me if you have any questions.

Thank you,  
Jenn

**Jennifer MacDonald**

Species at Risk Biologist | Biologiste des espèces en péril  
Species at Risk Management Division | Division de la gestion des espèces en péril  
Ecosystem Management | Gestion des écosystèmes  
Fisheries & Oceans Canada | Pêches & Océans Canada  
P.O. Box 1006 Dartmouth N.S. | C.P. 1006 Dartmouth N.E. B2Y 4A2  
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Email | Courriel: [jennifer.macdonald@dfo-mpo.gc.ca](mailto:jennifer.macdonald@dfo-mpo.gc.ca)



Fisheries and Oceans Pêches et Océans  
Canada Canada

SARA Permit No: DFO-MAR-2017-17

## PERMIT ISSUED UNDER SECTION 73 OF THE *SPECIES AT RISK ACT*

Subject to the conditions described in this permit, the holder of this permit ("Permit Holder"), or any qualified person acting under the authority of the Permit Holder, is authorized under the authority of subsection 73(1) of the *Species at Risk Act*, S.C. 2002, c.29 (SARA) to engage in activities (as described in this permit) that **harm, harass, capture, and possess** individuals of the following threatened or endangered aquatic species listed on Schedule 1 of SARA:

**White Shark** (*Carcharodon carcharias*), Atlantic population

### Permit issued to:

Name: OCEARCH ("Permit Holder"):  
Attention to: George Christopher Fischer  
Address: 1790 Bonanza Drive, Suite 101B  
Park City, Utah, USA 84060  
Email: [chris@oceanarch.org](mailto:chris@oceanarch.org)  
Phone: (435) 645-8990 (office) [REDACTED] (cellular)

The following individual operating under the authority of Fisheries and Oceans Canada (DFO) as "Permit Holder", and those under his supervision, may undertake the activities authorized by this permit:

Name	Organization
Robert Hueter	Mote Marine Laboratory

### Location of Proposed Activity

**This permit is only valid at the following location(s):**

Nearest community (city, town, village): N/A

Municipality, district, township, county: N/A

Province: N/A

Name of watercourse(s), waterbody(ies): **Atlantic Ocean**

Specific location: Mahone Bay, Bay of Fundy and the area around Sable Island

### Valid Permit Period

This permit is valid from **August 1, 2018** until **November 30, 2018**

If the Permit Holder cannot complete the activity during this period, Fisheries and Oceans Canada (DFO) must be notified in advance of the expiration of the time period, as soon as the Permit Holder is aware.

The period during which other conditions of this permit must be complied with are provided in their respective sections below. DFO may, where appropriate, amend this permit. In cases where the Valid Permit Period is extended, written notice and/or an amended permit will be provided to the Permit Holder.

Canada

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### Description of the Activity

The purpose of the activity is to conduct scientific research on White Sharks in Canadian waters to gain a better understanding of the role of Canadian waters in the life history of the White Shark population in the northwest Atlantic Ocean, the range of the species within Canadian waters and health of White Sharks. The researchers will attach acoustic and satellite tags, as well as collect various biological samples, from up to 20 sharks in Canadian waters.

The study area includes:

- Mahone Bay;
- Bay of Fundy; and
- Scotian Shelf.

Researchers will use chum to attract White Sharks in the study area to the fishing boat and larger research vessel. When a White Shark is sighted, either visually or using a drone, the fishing boat will target its fishing activities to attract and capture that shark. Chum bags, chum boxes, bait tanks, chum tubes and decoys may all be used to attract White Sharks to the fishing vessel. Once a White Shark is in the vicinity of the fishing vessel, the researchers will attempt to catch the shark using a 20/0 circle hook (zero offset) with a bite-blocker attached. In the case of a very large White Shark, a 27/0 circle hook (zero offset) with a buoy to prevent swallowing of the hook will be used. Once caught, the White Shark will be guided onboard the hydraulic lift on the research vessel, which will then be raised above the waterline. While on the lift, sharks will be provided with oxygenated seawater via a mouthpiece and tube.

Once on the lift, internal acoustic tags will be implanted surgically in the coelomic cavity and the incision will be sutured. Smart Position and Temperature (SPOT) tags will be attached on the leading edge of the first dorsal fin by drilling four holes in the dorsal fin with an electric drill and attaching the tag with nylon bolts, stainless steel locknuts and plastic spacers. The hardware is designed to retain the tag for five years after which it will fail and the tag will detach. All White Sharks caught, up to 20, will have both acoustic and SPOT tags applied. Pop-up Archival Satellite Tags (PSAT) will be attached via a tether to a subdermal metal dart implanted in the shark's flank below the first dorsal fin. PSAT tags will be attached to up to 6 White Sharks caught.

The researchers will also collect samples (blood, muscle, semen, fecal and urine samples), conduct skin, gill and cloacal swabs, collect parasites, collect eye and tail measurements, and perform an ultrasound (females). Samples will be collected using a hypodermic puncture and biopsy punch.

The activities authorized by this permit consist of:

- Actively attracting White Sharks to a vessel;
- Catch and release of White Sharks;
- Lifting individuals out of the water on a hydraulic lift;
- Collecting blood and tissue samples;
- Implanting internal acoustic tags; and
- Attaching SPOT and PSAT tags.

The effects that the activity may cause to the listed wildlife species and the effects of those changes authorized by this permit are as follows:

- Harm, harassment, capture and possession of listed aquatic species at risk.

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## Terms and Conditions of Permit

The activity must be carried on in accordance with the following conditions:

### 1. General Conditions

- 1.1. A copy of this permit shall be kept on site at all times in the possession of the Permit Holder or a person acting under the Permit Holder's authority, and shall be made available to an enforcement officer upon request.
- 1.2. All persons undertaking the activity under the authority of the Permit Holder shall do so under the direction and oversight of the Permit Holder and shall be made familiar with the conditions of this permit.
- 1.3. The activity must comply with the conditions identified within this permit. Activities that affect individuals of species at risk, their residences, or their critical habitat, other than those specifically identified within this permit are not authorized under this permit.
- 1.4. No changes to the Permitted activities shall take place without prior consultation with DFO, and written approval from DFO, Species at Risk Management Division. Contact information as follows:

**Species at Risk Management Division**  
**Fisheries and Oceans Canada**  
**P.O. Box 1006**  
**Dartmouth, NS, B2Y 4A2**  
**email: [SpeciesatRisk.xmar@dfo-mpo.gc.ca](mailto:SpeciesatRisk.xmar@dfo-mpo.gc.ca)**  
**phone: 1-866-891-0771 fax: 1-902-426-2331**

### 2. Conditions to avoid or minimize the impact of the activity on the species:

- 2.1. To the extent possible, activities shall be conducted in a manner whereby any individuals of the species shall be handled only in the circumstances authorized under this permit and with the least amount of harm.
- 2.2. Activities shall only be conducted in the study area described above. If activities are to be conducted outside the study area, DFO shall be notified in advance using the contact information in condition 1.4.
- 2.3. Only individuals that are experienced in tagging large pelagic fishes shall tag White Sharks.
- 2.4. White Sharks shall not be chased by the vessel.
- 2.5. The following gear shall be used: circle hooks (either 20/0 or 27/0 with zero offset) rigged with a cross bar bit-blocker (30cm up the leader) and attached to a stainless steel wire rope (3/32" or 1/8"). The leader shall be 10m in length and shall be attached to a braid rope with elasticity properties. Leaders shall be embedded inside a three-strand rope to increase the diameter.
- 2.6. Individual White Sharks shall not be kept on the research platform for longer than 20 minutes.
- 2.7. While on the research platform, oxygenated seawater shall be pumped through a hose and mouthpiece into the shark's buccal cavity at all times.
- 2.8. While on the research platform, a tail rope shall be used to prevent the animal from causing harm to itself and others.
- 2.9. While on the research platform, the animal's head and eyes shall be covered with wet towel to reduce animal stress and keep eyes moist.
- 2.10. While on the research platform, the animal's skin shall be kept wet.
- 2.11. While on the research platform animal stress shall be monitored by observing skin colouration, presence of blood pooling, gill movements, and animal activity. If acute stress is observed, the animal shall be released immediately.
- 2.12. The total time of engagement with a single White Shark from the time it is initially hooked until it is released shall be limited to 40 minutes.
- 2.13. No more than 20 White Sharks, in total, shall be tagged.
- 2.14. No attempts shall be made to tag White Sharks that are injured or behaving abnormally.
- 2.15. Only White Sharks greater than 3.5 metres in total length shall be caught and tagged.
- 2.16. A DFO representative shall be onboard as an observer during a subset of the expedition to be

determined by DFO.

- 2.17. In the event of a mortality or significant injury being sustained by a White Shark during a tagging attempt, all further attempts at tagging shall cease and DFO shall be contacted immediately using the contact information in condition 1.4. No further attempts at catching or tagging White Sharks shall be resumed until approved by DFO.

**3. Conditions that relate to monitoring and reporting:**

- 3.1. By December 31st, 2018, irrespective of whether the Permitted activities took place, a SARA Section 73 Permit Report shall be completed and returned to the Species at Risk Management Division using the contact information provided in condition 1.4. Without limiting the generality of the foregoing, the report shall contain the following information, to the satisfaction of DFO in its sole discretion:
- 3.1.1. to demonstrate that measures and standards to avoid and mitigate the impacts of the permitted activities on the species were implemented according to the conditions of this permit;
  - 3.1.2. an assessment of whether the measures and standards mentioned in condition 3.1.1 were successful at avoiding and mitigating the impacts of the permitted activities on the species;
  - 3.1.3. details of any contingency measures that were followed to prevent impacts greater than those authorized by this permit;
  - 3.1.4. for any interaction with, or sighting of, a White Shark, report the following: date, time, location, length, size, gender (specify if females are pregnant or not), condition of the individual; and identify if tagging was attempted or undertaken on that individual; and
  - 3.1.5. provide details of any tagging attempts, including whether tagging was successful, unplanned or unexpected impacts on the shark, reaction of the shark to the tagging, and lessons learned.

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**Authorization Limitations and Application Conditions**

This permit cannot be transferred or assigned to another party. If the activity authorized under this permit is sold or transferred to another party, or if other circumstances arise that result in another party taking over the activity, the Permit Holder shall advise DFO in advance if the ownership or responsibility for the activity is expected to change.

The failure to comply with any condition of this permit is an offence under section 97 of SARA and might result in charges being laid under SARA.

This permit may be revoked or amended to ensure the survival or recovery of White Shark. Without limiting the generality of the foregoing, DFO may:

- suspend any permitted activities to avoid or mitigate additional adverse direct or indirect effects to White Sharks;
- amend or revoke this permit; and
- direct the Permit Holder to carry out at the Permit Holder's expense any modifications or actions deemed necessary by DFO to avoid or mitigate existing impacts or to avoid further adverse direct and indirect impacts to White Sharks.


This permit is valid only with activities and species listed herein and for no other purposes. It does not authorize the Permit Holder to kill, buy, sell, or trade an individual of a wildlife species that is listed as extirpated, endangered or threatened, or any part or derivative of such an individual. This permit does not purport to release the Permit Holder from any obligation to obtain permission from or to comply with the requirements of any other regulatory agencies.



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Date of Issue: **APR 30 2010**

Signature of authorizing officer: \_\_\_\_\_

  
Donald Humphrey  
Manager, Species at Risk Management Division  
Maritimes Region  
Fisheries and Oceans Canada  
1 Challenger Drive, P.O. Box 1006, Dartmouth, NS, B2Y 4A2

Further information about this permit is available from the above authorizing officer ([Donald.Humphrey@dfo-mpo.gc.ca](mailto:Donald.Humphrey@dfo-mpo.gc.ca)).

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## PERMIT ISSUED UNDER SECTION 73 OF THE *SPECIES AT RISK ACT*

Subject to the conditions described in this permit, the holder of this permit ("Permit Holder"), or any qualified person acting under the authority of the Permit Holder, is authorized under the authority of subsection 73(1) of the *Species at Risk Act*, S.C. 2002, c.29 (SARA) to engage in activities (as described in this permit) that **harm, harass, capture, and possess** individuals of the following threatened or endangered aquatic species listed on Schedule 1 of SARA:

**White Shark** (*Carcharodon carcharias*), Atlantic population

### Permit issued to:

Name: OCEARCH ("Permit Holder"):  
Attention to: George Christopher Fischer  
Address: 1790 Bonanza Drive, Suite 101B  
Park City, Utah, USA 84060  
Email: [chris@oceanarch.org](mailto:chris@oceanarch.org)  
Phone: (435) 645-8990 (office) [REDACTED] (cellular)

The following individual operating under the authority of Fisheries and Oceans Canada (DFO) as "Permit Holder", and those under his supervision, may undertake the activities authorized by this permit:

Name	Organization
Robert Hueter	Mote Marine Laboratory

### Location of Proposed Activity

**This permit is only valid at the following location(s):**

Nearest community (city, town, village): N/A

Municipality, district, township, county: N/A

Province: N/A

Name of watercourse(s), waterbody(ies): **Atlantic Ocean**

Specific location: South coast of Newfoundland including: Placentia Bay (47° 05.00' N / 54° 32.00' W)

### Valid Permit Period

This permit is valid from 2018-08-01 until 2018-11-30.

If the Permit Holder cannot complete the activity during this period, Fisheries and Oceans Canada (DFO) must be notified in advance of the expiration of the time period, as soon as the Permit Holder is aware.

The period during which other conditions of this permit must be complied with are provided in their respective sections below. DFO may, where appropriate, amend this permit. In cases where the Valid Permit Period is extended, written notice and/or an amended permit will be provided to the Permit Holder.

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### Description of the Activity

The purpose of the activity is to conduct scientific research on White Sharks in Canadian waters to gain a better understanding of the role of Canadian waters in the life history of the White Shark population in the northwest Atlantic Ocean, the range of the species within Canadian waters and health of White Sharks. The researchers will attach acoustic and satellite tags, as well as collect various biological samples, from up to 20 sharks in Canadian waters.

The study area includes:

- South coast of Newfoundland including Placentia Bay (47° 05.00' N / 54° 32.00' W)

Researchers will use chum to attract White Sharks in the study area to the fishing boat and larger research vessel. When a White Shark is sighted, either visually or using a drone, the fishing boat will target its fishing activities to attract and capture that shark. Chum bags, chum boxes, bait tanks, chum tubes and decoys may all be used to attract White Sharks to the fishing vessel. Once a White Shark is in the vicinity of the fishing vessel, the researchers will attempt to catch the shark using a 20/0 circle hook (zero offset) with a bite-blocker attached. In the case of a very large White Shark, a 27/0 circle hook (zero offset) with a buoy to prevent swallowing of the hook will be used. Once caught, the White Shark will be guided onboard the hydraulic lift on the research vessel, which will then be raised above the waterline. While on the lift, sharks will be provided with oxygenated seawater via a mouthpiece and tube.

Once on the lift, internal acoustic tags will be implanted surgically in the coelomic cavity and the incision will be sutured. Smart Position and Temperature (SPOT) tags will be attached on the leading edge of the first dorsal fin by drilling four holes in the dorsal fin with an electric drill and attaching the tag with nylon bolts, stainless steel locknuts and plastic spacers. The hardware is designed to retain the tag for five years after which it will fail and the tag will detach. All White Sharks caught, up to 20, will have both acoustic and SPOT tags applied. Pop-up Archival Satellite Tags (PSAT) will be attached via a tether to a subdermal metal dart implanted in the shark's flank below the first dorsal fin. PSAT tags will be attached to up to 6 White Sharks caught.

The researchers will also collect samples (blood, muscle, semen, fecal and urine samples), conduct skin, gill and cloacal swabs, collect parasites, collect eye and tail measurements, and perform an ultrasound (females). Samples will be collected using a hypodermic puncture and biopsy punch.

The activities authorized by this permit consist of:

- Actively attracting White Sharks to a vessel;
- Catch and release of White Sharks;
- Lifting individuals out of the water on a hydraulic lift;
- Collecting blood and tissue samples;
- Implanting internal acoustic tags; and
- Attaching SPOT and PSAT tags.

The effects that the activity may cause to the listed wildlife species and the effects of those changes authorized by this permit are as follows:

- Harm, harassment, capture and possession of listed aquatic species at risk.

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## Terms and Conditions of Permit

The activity must be carried on in accordance with the following conditions:

### 1. General Conditions

- 1.1. A copy of this permit shall be kept on site at all times in the possession of the Permit Holder or a person acting under the Permit Holder's authority, and shall be made available to an enforcement officer upon request.
- 1.2. All persons undertaking the activity under the authority of the Permit Holder shall do so under the direction and oversight of the Permit Holder and shall be made familiar with the conditions of this permit.
- 1.3. The activity must comply with the conditions identified within this permit. Activities that affect individuals of species at risk, their residences, or their critical habitat, other than those specifically identified within this permit are not authorized under this permit.
- 1.4. No changes to the Permitted activities shall take place without prior consultation with DFO, and written approval from DFO, Species at Risk Management Division. Contact information as follows:

**Species at Risk Management Division**  
**Fisheries and Oceans Canada**  
**80 East White Hills Road**  
**PO Box 5667**  
**St. John's, NL, A1C 5X1**  
**email: [SARANL-LEPTNL@dfo-mpo.gc.ca](mailto:SARANL-LEPTNL@dfo-mpo.gc.ca)**  
**phone: 1-709-772-2443 fax: 1-709-772-5562**

### 2. Conditions to avoid or minimize the impact of the activity on the species:

- 2.1. To the extent possible, activities shall be conducted in a manner whereby any individuals of the species shall be handled only in the circumstances authorized under this permit and with the least amount of harm.
  - 2.2. Activities shall only be conducted in the study area described above. If activities are to be conducted outside the study area, DFO shall be notified in advance using the contact information in condition 1.4.
  - 2.3. Only individuals that are experienced in tagging large pelagic fishes shall tag White Sharks.
  - 2.4. White Sharks shall not be chased by the vessel.
  - 2.5. The following gear shall be used: circle hooks (either 20/0 or 27/0 with zero offset) rigged with a cross bar bit-blocker (30cm up the leader) and attached to a stainless steel wire rope (3/32" or 1/8"). The leader shall be 10m in length and shall be attached to a braid rope with elasticity properties. Leaders shall be embedded inside a three-strand rope to increase the diameter.
  - 2.6. Individual White Sharks shall not be kept on the research platform for longer than 20 minutes.
  - 2.7. While on the research platform, oxygenated seawater shall be pumped through a hose and mouthpiece into the shark's buccal cavity at all times.
  - 2.8. While on the research platform, a tail rope shall be used to prevent the animal from causing harm to itself and others.
  - 2.9. While on the research platform, the animal's head and eyes shall be covered with wet towel to reduce animal stress and keep eyes moist.
  - 2.10. While on the research platform, the animal's skin shall be kept wet.
  - 2.11. While on the research platform animal stress shall be monitored by observing skin colouration, presence of blood pooling, gill movements, and animal activity. If acute stress is observed, the animal shall be released immediately.
  - 2.12. The total time of engagement with a single White Shark from the time it is initially hooked until it is released shall be limited to 40 minutes.
  - 2.13. No more than 20 White Sharks, in total, shall be tagged.
  - 2.14. No attempts shall be made to tag White Sharks that are injured or behaving abnormally.
  - 2.15. Only White Sharks greater than 3.5 metres in total length shall be caught and tagged.
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- 2.16. A DFO representative shall be onboard as an observer during a subset of the expedition to be determined by DFO.
- 2.17. In the event of a mortality or significant injury being sustained by a White Shark during a tagging attempt, all further attempts at tagging shall cease and DFO shall be contacted immediately using the contact information in condition 1.4. No further attempts at catching or tagging White Sharks shall be resumed until approved by DFO.

**3. Conditions that relate to monitoring and reporting:**

- 3.1. By December 31, 2018, irrespective of whether the Permitted activities took place, a SARA Section 73 Permit Report shall be completed and returned to the Species at Risk Management Division using the contact information provided in condition 1.4. Without limiting the generality of the foregoing, the report shall contain the following information, to the satisfaction of DFO in its sole discretion:
  - 3.1.1. to demonstrate that measures and standards to avoid and mitigate the impacts of the permitted activities on the species were implemented according to the conditions of this permit;
  - 3.1.2. an assessment of whether the measures and standards mentioned in condition 3.1.1 were successful at avoiding and mitigating the impacts of the permitted activities on the species;
  - 3.1.3. details of any contingency measures that were followed to prevent impacts greater than those authorized by this permit;
  - 3.1.4. for any interaction with, or sighting of, a White Shark, report the following: date, time, location, length, size, gender (specify if females are pregnant or not), condition of the individual; and identify if tagging was attempted or undertaken on that individual; and
  - 3.1.5. provide details of any tagging attempts, including whether tagging was successful, unplanned or unexpected impacts on the shark, reaction of the shark to the tagging, and lessons learned.

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**Authorization Limitations and Application Conditions**

This permit cannot be transferred or assigned to another party. If the activity authorized under this permit is sold or transferred to another party, or if other circumstances arise that result in another party taking over the activity, the Permit Holder shall advise DFO in advance if the ownership or responsibility for the activity is expected to change.

The failure to comply with any condition of this permit is an offence under section 97 of SARA and might result in charges being laid under SARA.

This permit may be revoked or amended to ensure the survival or recovery of White Shark. Without limiting the generality of the foregoing, DFO may:

- suspend any permitted activities to avoid or mitigate additional adverse direct or indirect effects to White Sharks;
- amend or revoke this permit; and
- direct the Permit Holder to carry out at the Permit Holder's expense any modifications or actions deemed necessary by DFO to avoid or mitigate existing impacts or to avoid further adverse direct and indirect impacts to White Sharks.

This permit is valid only with activities and species listed herein and for no other purposes. It does not authorize the Permit Holder to kill, buy, sell, or trade an individual of a wildlife species that is listed as extirpated, endangered or threatened, or any part or derivative of such an individual. This permit does not purport to release the Permit Holder from any obligation to obtain permission from or to comply with the requirements of any other regulatory agencies.

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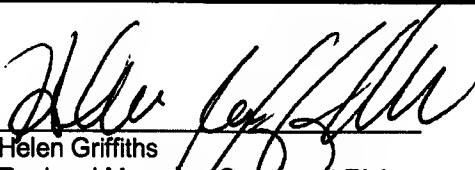
Date of Issue: 2018-04-30

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Signature of authorizing officer:

  
Helen Griffiths  
Regional Manager, Species at Risk  
Newfoundland and Labrador Region  
Fisheries and Oceans Canada  
80 East White Hills Road, PO Box 5667, St. John's NL A1C 5X1

Further information about this permit is available from the above authorizing officer ([Helen.Griffiths@dfo-mpo.gc.ca](mailto:Helen.Griffiths@dfo-mpo.gc.ca)).

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## SARA Section 73 Permit Report

### SECTION A: PERMIT INFORMATION

REPORTING YEAR:		PERMIT/LICENCE#:	
PERMIT HOLDER NAME:		PERMIT HOLDER ORGANIZATION:	
PERMIT ISSUANCE DATE:		PERMIT EXPIRY DATE:	

### SECTION B: PROJECT STATUS

PROJECT STATUS: ☐ COMPLETED ☐ CONTINUING ☐ SUSPENDED ☐ TERMINATED

PROPOSED END DATE OF PROJECT: [Click here to enter a date.](#)

WILL A PERMIT RENEWAL BE REQUESTED IN THE FUTURE? ☐ YES ☐ NO ☐ NOT SURE

IF YES, FOR WHAT YEAR(S)	
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WERE ANY OF THE ACTIVITIES AUTHORIZED BY THIS PERMIT PERFORMED WITHIN THE EFFECTIVE DATES OF THE PERMIT? ☐ YES ☐ NO

IF YES, COMPLETE ALL RELEVANT SECTIONS OF THIS REPORT.

IF NO, EXPLAIN WHY, USING THE SPACE BELOW, AND GO TO SECTION G OF THIS REPORT.

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**INSTRUCTIONS: PLEASE COMPLETE SECTIONS C TO F BELOW. ADDITIONAL INFORMATION CAN BE PROVIDED IN A SEPARATE DOCUMENT USING SECTION HEADINGS CORRESPONDING TO THOSE BELOW IF NECESSARY.**

### SECTION C: REPORT OF ACTIVITIES

Describe each activity, authorized by the SARA Section 73 Permit, that was undertaken. Provide details on who performed the activity, when it took place, where it took place, what methods and equipment were used, and whether or not performing the activity resulted in an interaction with the SARA-listed species. For any activities resulting in one or more interactions with the SARA-listed species, indicate the specific Record(s) of Interaction to refer to in Section D.

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#### SECTION D: RECORD OF INTERACTIONS

Provide all records and information pertaining to any interactions with the SARA-listed species, as specified and required by the conditions of the SARA Section 73 Permit.

#### SECTION E: OTHER REQUIRED SUBMISSIONS

Provide any additional information or materials pertaining to the project as specified and required by the conditions of the SARA Section 73 Permit or, if none is required, check the box below:

☐ THE SUBMISSION OF OTHER INFORMATION OR MATERIALS IS NOT REQUIRED BY THE TERMS OF THE PERMIT

#### SECTION F: OPTIONAL SUBMISSIONS

Provide any additional information or materials to share with Fisheries and Oceans Canada pertaining to your work or the SARA Section 73 Permit. This may include any additional information or findings, future plans with respect to work involving or affecting SARA-listed species, any challenges the conditions of the permit presented in completing the planned activities and/or any suggestions for additional or alternative measures that could be taken in the future to minimize the impact of the activity on the species. If no information will be provided, check the box below:

☐ I HAVE NO ADDITIONAL INFORMATION OR MATERIALS THAT I WISH TO SUBMIT

#### SECTION G: SUBMIT COMPLETED REPORT

SUBMIT YOUR COMPLETED REPORT AND ALL REQUIRED ATTACHMENTS ANNUALLY ON OR BEFORE THE DATE STIPULATED IN YOUR PERMIT.

**BY MAIL:** Fisheries and Oceans Canada  
Species at Risk Management Division

**BY EMAIL:** [SpeciesatRisk.xmar@dfo-mpo.gc.ca](mailto:SpeciesatRisk.xmar@dfo-mpo.gc.ca)



PO Box 1006, Station P500  
Dartmouth, Nova Scotia B2Y 4A2  
Canada

**BY FAX:** 902-426-2331

REPORT COMPLETED BY (*Print Name*):

SIGNATURE:

DATE COMPLETED: Click here to enter a date.

#### **SECTION H: PRIVACY NOTICE STATEMENT**

The information you provide in relation to this form is collected under the authority of the *Species at Risk Act* for the purpose of permit reporting. The information may be used for evaluation and compliance. You have the right to the correction of, access to, and protection of, your personal information under the *Privacy Act* and to file a complaint with the Privacy Commissioner of Canada over Fisheries and Oceans Canada's handling of your information. Personal information collected through the permitting process is described in the Personal Information Bank number DFO PPU 770 and can be accessed and assessed for accuracy. For more information, visit [http://www.inter.dfo-mpo.gc.ca/atip/infosource\\_e/pib-e/Species\\_at\\_Risk\\_Act\\_Permit-e](http://www.inter.dfo-mpo.gc.ca/atip/infosource_e/pib-e/Species_at_Risk_Act_Permit-e). Info Source is a series of publications containing information about and/or collected by the Government of Canada.

## SARA Section 73 Permit Report

### SECTION A: PERMIT INFORMATION

REPORTING YEAR:		PERMIT/LICENCE#:	
PERMIT HOLDER NAME:		PERMIT HOLDER ORGANIZATION:	
PERMIT ISSUANCE DATE:		PERMIT EXPIRY DATE:	

### SECTION B: PROJECT STATUS

PROJECT STATUS: ☐ COMPLETED ☐ CONTINUING ☐ SUSPENDED ☐ TERMINATED

PROPOSED END DATE OF PROJECT: Click here to enter a date.

WILL A PERMIT RENEWAL BE REQUESTED IN THE FUTURE? ☐ YES ☐ NO ☐ NOT SURE

IF YES, FOR WHAT YEAR(S)	
--------------------------	--

WERE ANY OF THE ACTIVITIES AUTHORIZED BY THIS PERMIT PERFORMED WITHIN THE EFFECTIVE DATES OF THE PERMIT? ☐ YES ☐ NO

IF YES, COMPLETE ALL RELEVANT SECTIONS OF THIS REPORT.

IF NO, EXPLAIN WHY, USING THE SPACE BELOW, AND GO TO SECTION G OF THIS REPORT.

--

***INSTRUCTIONS: PLEASE COMPLETE SECTIONS C TO F BELOW. ADDITIONAL INFORMATION CAN BE PROVIDED IN A SEPARATE DOCUMENT USING SECTION HEADINGS CORRESPONDING TO THOSE BELOW IF NECESSARY.***

### SECTION C: REPORT OF ACTIVITIES

Describe each activity, authorized by the SARA Section 73 Permit, that was undertaken. Provide details on who performed the activity, when it took place, where it took place, what methods and equipment were used, and whether or not performing the activity resulted in an interaction with the SARA-listed species. For any activities resulting in one or more interactions with the SARA-listed species, indicate the specific Record(s) of Interaction to refer to in Section D.

--

#### SECTION D: RECORD OF INTERACTIONS

Provide all records and information pertaining to any interactions with the SARA-listed species, as specified and required by the conditions of the SARA Section 73 Permit.

#### SECTION E: OTHER REQUIRED SUBMISSIONS

Provide any additional information or materials pertaining to the project as specified and required by the conditions of the SARA Section 73 Permit or, if none is required, check the box below:

☐ THE SUBMISSION OF OTHER INFORMATION OR MATERIALS IS NOT REQUIRED BY THE TERMS OF THE PERMIT

#### SECTION F: OPTIONAL SUBMISSIONS

Provide any additional information or materials to share with Fisheries and Oceans Canada pertaining to your work or the SARA Section 73 Permit. This may include any additional information or findings, future plans with respect to work involving or affecting SARA-listed species, any challenges the conditions of the permit presented in completing the planned activities and/or any suggestions for additional or alternative measures that could be taken in the future to minimize the impact of the activity on the species. If no information will be provided, check the box below:

☐ I HAVE NO ADDITIONAL INFORMATION OR MATERIALS THAT I WISH TO SUBMIT

#### SECTION G: SUBMIT COMPLETED REPORT

SUBMIT YOUR COMPLETED REPORT AND ALL REQUIRED ATTACHMENTS ANNUALLY ON OR BEFORE THE DATE STIPULATED IN YOUR PERMIT.

**BY MAIL:** Fisheries and Oceans Canada  
Species at Risk Management Division

**BY EMAIL:** [SARANL-LEPTNL@dfo-mpo.gc.ca](mailto:SARANL-LEPTNL@dfo-mpo.gc.ca)

PO Box 1006, Station P500  
Dartmouth, Nova Scotia B2Y 4A2  
Canada

**BY FAX:** 902-426-2331

REPORT COMPLETED BY (*Print Name*):

SIGNATURE:

DATE COMPLETED: Click here to enter a date.

#### SECTION H: PRIVACY NOTICE STATEMENT

The information you provide in relation to this form is collected under the authority of the *Species at Risk Act* for the purpose of permit reporting. The information may be used for evaluation and compliance. You have the right to the correction of, access to, and protection of, your personal information under the *Privacy Act* and to file a complaint with the Privacy Commissioner of Canada over Fisheries and Oceans Canada's handling of your information. Personal information collected through the permitting process is described in the Personal Information Bank number DFO PPU 770 and can be accessed and assessed for accuracy. For more information, visit [http://www.inter.dfo-mpo.gc.ca/atip/infosource\\_e/pib-e/Species\\_at\\_Risk\\_Act\\_Permit-e](http://www.inter.dfo-mpo.gc.ca/atip/infosource_e/pib-e/Species_at_Risk_Act_Permit-e). Info Source is a series of publications containing information about and/or collected by the Government of Canada.

## MacDonald, Jennifer

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**From:** Robert Hueter <rhuetter@mote.org>  
**Sent:** April-30-18 2:53 PM  
**To:** MacDonald, Jennifer  
**Cc:** Chris Fischer; Fernanda Ubatuba; Brandon Eyre; Bryan Franks  
**Subject:** Fwd: SARA Section 73 Permit - White Shark Tagging

Thank you so much for sending this, Jenn, it's great to see our new SARA permit! We're heading towards a two-day planning meeting of OCEARCH principals and we'll read through these docs and let you know if we have any questions. Meanwhile we're still wading through the confusing process of the other Canadian permits, hope that gets resolved soon. Thanks again for all your help with this!

Bob

### **ROBERT E. HUETER, Ph.D.**

*Senior Scientist & Director, Center for Shark Research  
Perry W. Gilbert Chair in Shark Research  
Manager, Sharks & Rays Conservation Research Program  
Mote Marine Laboratory  
1600 Ken Thompson Parkway  
Sarasota, FL 34236 USA*

[rhuetter@mote.org](mailto:rhuetter@mote.org)  
Tel: 941-388-1827  
Fax: 941-388-4312  
More info at: [www.mote.org](http://www.mote.org)

----- Forwarded Message -----

**Subject:**SARA Section 73 Permit - White Shark Tagging

**Date:**Mon, 30 Apr 2018 17:43:35 +0000

**From:**MacDonald, Jennifer <[Jennifer.MacDonald@dfo-mpo.gc.ca](mailto:Jennifer.MacDonald@dfo-mpo.gc.ca)>

**To:**Robert Hueter <[rhuetter@mote.org](mailto:rhuetter@mote.org)>, Chris Fischer <[chris@oearch.org](mailto:chris@oearch.org)>

**CC:**Humphrey, Donald <[Donald.Humphrey@dfo-mpo.gc.ca](mailto:Donald.Humphrey@dfo-mpo.gc.ca)>, Sullivan, Katrina <[Katrina.Sullivan@dfo-mpo.gc.ca](mailto:Katrina.Sullivan@dfo-mpo.gc.ca)>, Forsey, Sue <[Sue.Forsey@dfo-mpo.gc.ca](mailto:Sue.Forsey@dfo-mpo.gc.ca)>

Hello Bob and Chris,

I have attached the *Species at Risk Act* Section 73 Permits authorizing activities affecting White Shark in the waters off Nova Scotia and Newfoundland and Labrador respectively. Copies of the signed permits should be kept at the work site(s) at all times. Please read the permits to ensure that you are familiar with all of the conditions including the information that must be collected and recorded, as well as the circumstances where there is a requirement to provide notification to Fisheries and Oceans Canada.

I have also attached SARA Permit Report Forms (for Maritimes and Newfoundland and Labrador respectively). You are required to submit a completed SARA Permit Report by December 31<sup>st</sup>, 2018.

Please confirm that you have received this email. Feel free to contact me if you have any questions.

Thank you,  
Jenn

**Jennifer MacDonald**

Species at Risk Biologist | Biologiste des espèces en péril

Species at Risk Management Division | Division de la gestion des espèces en péril

Ecosystem Management | Gestion des écosystèmes

Fisheries & Oceans Canada | Pêches & Océans Canada

P.O. Box 1006 Dartmouth N.S. | C.P. 1006 Dartmouth N.E. B2Y 4A2

Tel | Tél: (902) 407-8175 Fax | Téléc: (902) 426-2331

Email | Courriel: [jennifer.macdonald@dfo-mpo.gc.ca](mailto:jennifer.macdonald@dfo-mpo.gc.ca)

## MacDonald, Jennifer

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**From:** Chris Fischer <chris@oceanarch.org>  
**Sent:** April-30-18 3:09 PM  
**To:** MacDonald, Jennifer  
**Cc:** Robert Hueter; Humphrey, Donald; Sullivan, Katrina; Forsey, Sue  
**Subject:** Re: SARA Section 73 Permit - White Shark Tagging

Thank you all so much.  
Truly grateful,  
Chris

Chris Fischer  
Founding Chairman  
Oceanarch  
[www.Oceanarch.org](http://www.Oceanarch.org)

On Apr 30, 2018, at 11:43 AM, MacDonald, Jennifer <[Jennifer.MacDonald@dfo-mpo.gc.ca](mailto:Jennifer.MacDonald@dfo-mpo.gc.ca)> wrote:

Hello Bob and Chris,

I have attached the *Species at Risk Act* Section 73 Permits authorizing activities affecting White Shark in the waters off Nova Scotia and Newfoundland and Labrador respectively. Copies of the signed permits should be kept at the work site(s) at all times. Please read the permits to ensure that you are familiar with all of the conditions including the information that must be collected and recorded, as well as the circumstances where there is a requirement to provide notification to Fisheries and Oceans Canada.

I have also attached SARA Permit Report Forms (for Maritimes and Newfoundland and Labrador respectively). You are required to submit a completed SARA Permit Report by December 31<sup>st</sup>, 2018.

Please confirm that you have received this email. Feel free to contact me if you have any questions.

Thank you,  
Jenn

**Jennifer MacDonald**

Species at Risk Biologist | Biologiste des espèces en péril  
Species at Risk Management Division | Division de la gestion des espèces en péril  
Ecosystem Management | Gestion des écosystèmes  
Fisheries & Oceans Canada | Pêches & Océans Canada  
P.O. Box 1006 Dartmouth N.S. | C.P. 1006 Dartmouth N.E. B2Y 4A2  
Tel | Tél: (902) 407-8175 Fax | Téléc: (902) 426-2331  
Email | Courriel: [jennifer.macdonald@dfo-mpo.gc.ca](mailto:jennifer.macdonald@dfo-mpo.gc.ca)

<Permit Report Form (updated 2018).docx>

<Permit Report Form (updated 2018) NL version.docx>

<OCEARCH-Signed Permit\_Maritimes Region.pdf>

<scanned permit DFO-NLSAR-001-18.pdf>

No information has been removed or severed from this page



## MacDonald, Jennifer

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**From:** Humphrey, Donald  
**Sent:** May-01-18 11:34 AM  
**To:** King, Rhea L  
**Cc:** Dunn, Andy  
**Subject:** RE: FOR INPUT: 2018-001-00756 Eyre to K. Curlett by May 7

We can take care of the response. The SARA permit was issued yesterday so it should be a short response.

I need to brief you on this as there are a few things you should be aware of.

Donald

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**From:** King, Rhea L  
**Sent:** May-01-18 11:31 AM  
**To:** Humphrey, Donald  
**Cc:** Dunn, Andy  
**Subject:** FW: FOR INPUT: 2018-001-00756 Eyre to K. Curlett by May 7

For review and input. As well, can you please advise if this should also go to RM?

Thanks,  
Rhea

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**From:** Curlett, Karen A  
**Sent:** May-01-18 10:29 AM  
**To:** King, Rhea L  
**Cc:** Dunn, Andy  
**Subject:** FOR INPUT: 2018-001-00756 Eyre to K. Curlett by May 7

Hi Rhea. For draft reply please due back to me for RDG approval Monday May 7<sup>th</sup>.  
thank you  
Karen

**From:** Maloney, Barbara  
**Sent:** Monday, April 30, 2018 6:00 PM  
**To:** Curlett, Karen A <Karen.Curlett@dfo-mpo.gc.ca>  
**Subject:** FOR INPUT: 2018-001-00756 Eyre to K. Curlett by May 7

Hi Karen,

The attached docket concerns the application process for a Marine Mammal Transportation Permit in order to allow the correspondent to research white sharks in Canadian waters around Nova Scotia and Newfoundland.

Could you please provide input and any necessary revisions by **May 7**.

Please note that previous correspondence from this organization (OCEARCH), regarding a Species at Risk research permit, can be found in docket **2017-001-02427** (Main Docs attached).

If you are not the correct contact person, please advise me of the correct contact person as soon as possible so I can redirect my request.

Thanks very much,

Barbara Maloney  
Writer/Editor, Ministerial Correspondence Control Unit  
Fisheries and Oceans Canada / Government of Canada  
[barbara.maloney@dfo-mpo.gc.ca](mailto:barbara.maloney@dfo-mpo.gc.ca)

Rédactrice-révisseuse, Unité du contrôle de la correspondance ministérielle  
Pêches et Océans Canada / Gouvernement du Canada  
[barbara.maloney@dfo-mpo.gc.ca](mailto:barbara.maloney@dfo-mpo.gc.ca)

[XNCR-GrpCW/RC@dfo-mpo.gc.ca](mailto:XNCR-GrpCW/RC@dfo-mpo.gc.ca) to contact all MCCU Writers / pour rejoindre tous les rédacteurs d'UCCM  
[XNCR-GrpCA/AC@dfo-mpo.gc.ca](mailto:XNCR-GrpCA/AC@dfo-mpo.gc.ca) to contact all MCCU Analysts / pour rejoindre tous les analystes d'UCCM

**Pages 398 to / à 402  
are duplicates of  
sont des duplicatas des  
pages 720 to / à 724**



UNITED STATES DEPARTMENT OF COMMERCE  
National Oceanic and Atmospheric Administration  
NATIONAL MARINE FISHERIES SERVICE  
Silver Spring, MD 20910

**National Marine Fisheries Service  
Highly Migratory Species Management Division  
Letter of Acknowledgement (LOA)**

**LOA Number:** SHK-LOA-18-01

**Acknowledged Dates:** Date of issuance through  
February 28, 2019

**Acknowledged Activity:** Tag (with conventional, pop-up satellite archival tags, and acoustic tags) and collect non-lethal samples from white sharks and other Atlantic shark species incidentally caught.

**Acknowledged Sampler(s):** Chris Fischer, Brett McBride, David Stevenson, Brandon Eyre, DJ Lettieri, Robert Hueter, Bryan Franks, Kimberly Ritchie, Jim Gelsleichter, Alisa Newton, Michael Hyatt, Lisa Hoopes

**Authorized Vessel(s):** *M/V OCEARCH*,  
Vessel ID 967106; *Contender* Hull ID  
JDJ25583E910; *Safe Boat* Hull ID  
EGO01581D111N1267

**Acknowledged Area(s)/Timing of Exempted Activity:** Sampling will be conducted in **Federal waters** of the Atlantic Ocean and the Gulf of Mexico. 3 to 5 research trips will be conducted; each with a duration of 20-30 days.

**Acknowledged Gear(s)/Amount of Gear:** Sharks will be captured using buoy gear and rod and reel. The buoy gear will have a mainline equipped with a single 20/0 or 27/0 circle hook on a wire leader. The setup is suspended from either a polyball or high flyer at the surface, which then drifts with the current. Rod and reel gear will be fished with a single circle hook.

**Acknowledged Species:** White sharks (*Carcharodon carcharias*) are the primary species anticipated to be tagged and sampled, but other shark species that might be opportunistically tagged and sampled include: tiger (*Galeocerdo cuvier*), great hammerhead (*Sphyrna mokarran*), smooth hammerhead (*Sphyrna zygaena*), bull (*Carcharhinus leucas*), sand tiger (*Carcharhinus taurus*), shortfin mako (*Isurus oxyrinchus*), longfin mako (*Isurus paucus*), oceanic whitetip (*Carcharhinus longimanus*), blue (*Prionace glauca*), silky (*Carcharhinus falciformis*), Caribbean reef (*Carcharhinus perezi*), and dusky (*Carcharhinus obscurus*) sharks. Non-lethal biological samples may be retained from all sharks.

In case of unintentional mortality, scientific and educational value of the animal will be maximized by collecting as many samples as possible, i.e. genetics, reproductive biology, age and growth, ecotoxicology, etc. The remains will be discarded at sea.

**Federal Regulations (CFR Citation, Summary Text):** Activities conducted on the *M/V OCEARCH* should be carried out in accordance with the scientific research plan or HMS LOA application submitted to NMFS, and accompanied by this signed LOA, with a specified researcher/sampler onboard. This letter does not exempt the researchers from regulations in 50 CFR Part 635 pertaining to the required safe handling and release gear according to § 635.21(d). The researchers must also have a valid protected species safe handling, release, and identification participant workshop certificate on board the vessel; at least one certified, trained individual **MUST** be onboard the vessel during all sampling trips.

**Quota Requirements/Notes:** While scientific research is not regulated under the Magnuson-Stevens Fishery Conservation and Management Act, NMFS attempts to track and monitor all sources of mortality. The applicant must submit interim reports on a timely basis; including all of the necessary information on harvest (see Reporting Requirements below).



## **Terms and Conditions:**

***Please note that this LOA formally acknowledges collection of species only in Federal waters. The appropriate state fish and wildlife agency must be contacted regarding any collection in state waters, as separate state permits may be required for collection/harvest in state waters.***

- ***Limitations on Collection/Harvest***

Under 50 CFR part 635 and consistent with 50 CFR §600.745, the Director of the Office of Sustainable Fisheries, NMFS, acknowledges that Chris Fischer has submitted a scientific research plan to tag and collect non-lethal biological samples from sharks in 2018. NMFS only acknowledges collections/harvests when the sampler(s) listed above are present on the vessel listed above. Third-party collectors should not collect species under this LOA. In order to facilitate identification of these activities as scientific research, a copy of the scientific research plan and this LOA should be carried onboard the research vessel while conducting the research activities and should accompany the samples during shipment. Generally, activities conducted in accordance with a scientific research plan as acknowledged by a LOA are presumed to be scientific research. This presumption may be overcome if it can be shown that an activity does not fit the definition of "scientific research activity" or is outside the scope of scientific research plan. Fish, or parts thereof, retained under this LOA must be used for scientific research only. No fish of any species, nor any part thereof, may be purchased, bartered, or sold under this LOA.

Interactions with species listed as threatened or endangered under the Endangered Species Act (ESA) that were consulted over in the December 12, 2012 Biological Opinion (BiOp) will be considered against the Incidental Take Statement (ITS) in that BiOp for any takes of those species with handgear. The LOA holder has agreed to comply with the Reasonable and Prudent Measures and Terms and Conditions of the 2012 BiOps in order to be eligible for such coverage and will report specimens to the HMS Management Division via submittal of Interim and Annual Reports. Any protected resources caught while engaging in research activities must be safely handled, resuscitated, and released, and all protected resource interactions must be reported to NMFS.

Please be advised that these actions may require additional authorizations under both the ESA for interactions with scalloped hammerhead sharks from the Central and Southwest Atlantic Distinct Population Segment and corals and the Marine Mammal Protection Act for interactions with marine mammals. Please consult the following website and/or contact the Office of Protected Resources in Silver Spring, Maryland at 301-427-8400 for information about additional requirements (<http://www.nmfs.noaa.gov/pr/permits/types.htm>). This LOA does not authorize the incidental take of marine mammals prohibited by the Marine Mammal Protection Act or the take of ESA listed species (other than as specified above), including the take of scalloped hammerhead sharks from the Central and Southwest Atlantic Distinct Population Segment or corals prohibited by the ESA.

- ***Reporting Requirements***

In order to be eligible for coverage under the 2012 BiOp, for all species caught during sampling trips, including target and incidental catch, the letter holder must submit a completed Interim Report with the information specified, to the HMS Management Division within 5 days of a fishing trip. Additionally, the letter holder must submit an Annual Report within 30 days of the expiration date of this LOA. Copies of both the Interim and Annual Report Forms are enclosed for your use (electronic forms may be requested). *Please do not submit your own form to meet these reporting requirements.* Reports must be submitted to the Highly Migratory Species Management Division, National Marine Fisheries Service, F/SF1, 1315 East-West Highway, Silver Spring, Maryland 20910 or submitted

electronically to [NMFS.HMS.EFPS@noaa.gov](mailto:NMFS.HMS.EFPS@noaa.gov). This information will be incorporated into future stock assessments.

- **Sea Turtle Safe Handling/Release/Resuscitation Requirements**

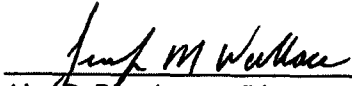
A placard that outlines the Sea Turtle Safe Handling and Release Guidelines is available and must be posted in the wheelhouse of the authorized vessel. If additional placards are required, please call (301) 427-8503 to request them. Resuscitation requirements for sea turtles must also be followed when conducting the authorized activity and these requirements are outlined in 50 CFR 223.206. All authorized samplers and vessels (listed above) must comply with Sea Turtle Safe Handling and Release Guidelines as published in the Federal Register on February 7, 2007 (72 FR 5633).

**Informational Contact(s):**

**Permit Holder's Name:** George Christopher Fischer  
**NMFS Staff:** Lauren Latchford

**Phone:** (435) 645-8990

**Phone:** (301) 427-8503

*for*   
\_\_\_\_\_  
Alan D. Risenhoover, Director  
Office of Sustainable Fisheries  
National Marine Fisheries Service

4/24/18  
Date



Fisheries and Oceans   Pêches et Océans  
Canada   Canada

## PERMIT ISSUED UNDER SECTION 73 OF THE *SPECIES AT RISK ACT*

Subject to the conditions described in this permit, the holder of this permit ("Permit Holder"), or any qualified person acting under the authority of the Permit Holder, is authorized under the authority of subsection 73(1) of the *Species at Risk Act*, S.C. 2002, c.29 (SARA) to engage in activities (as described in this permit) that **harm, harass, capture, and possess** individuals of the following threatened or endangered aquatic species listed on Schedule 1 of SARA:

**White Shark** (*Carcharodon carcharias*), Atlantic population

### Permit issued to:

Name: OCEARCH ("Permit Holder"):  
Attention to: George Christopher Fischer  
Address: 1790 Bonanza Drive, Suite 101B  
Park City, Utah, USA 84060  
Email: [chris@oceanarch.org](mailto:chris@oceanarch.org)  
Phone: (435) 645-8990 (office) [REDACTED] (cellular)

The following individual operating under the authority of Fisheries and Oceans Canada (DFO) as "Permit Holder", and those under his supervision, may undertake the activities authorized by this permit:

Name	Organization
Robert Hueter	Mote Marine Laboratory

### Location of Proposed Activity

**This permit is only valid at the following location(s):**

Nearest community (city, town, village): N/A

Municipality, district, township, county: N/A

Province: N/A

Name of watercourse(s), waterbody(ies): **Atlantic Ocean**

Specific location: South coast of Newfoundland including: Placentia Bay (47° 05.00' N / 54° 32.00' W)

### Valid Permit Period

This permit is valid from 2018-08-01 until 2018-11-30.

If the Permit Holder cannot complete the activity during this period, Fisheries and Oceans Canada (DFO) must be notified in advance of the expiration of the time period, as soon as the Permit Holder is aware.

The period during which other conditions of this permit must be complied with are provided in their respective sections below. DFO may, where appropriate, amend this permit. In cases where the Valid Permit Period is extended, written notice and/or an amended permit will be provided to the Permit Holder.

Canada

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### Description of the Activity

The purpose of the activity is to conduct scientific research on White Sharks in Canadian waters to gain a better understanding of the role of Canadian waters in the life history of the White Shark population in the northwest Atlantic Ocean, the range of the species within Canadian waters and health of White Sharks. The researchers will attach acoustic and satellite tags, as well as collect various biological samples, from up to 20 sharks in Canadian waters.

The study area includes:

- South coast of Newfoundland including Placentia Bay (47° 05.00' N / 54° 32.00' W)

Researchers will use chum to attract White Sharks in the study area to the fishing boat and larger research vessel. When a White Shark is sighted, either visually or using a drone, the fishing boat will target its fishing activities to attract and capture that shark. Chum bags, chum boxes, bait tanks, chum tubes and decoys may all be used to attract White Sharks to the fishing vessel. Once a White Shark is in the vicinity of the fishing vessel, the researchers will attempt to catch the shark using a 20/0 circle hook (zero offset) with a bite-blocker attached. In the case of a very large White Shark, a 27/0 circle hook (zero offset) with a buoy to prevent swallowing of the hook will be used. Once caught, the White Shark will be guided onboard the hydraulic lift on the research vessel, which will then be raised above the waterline. While on the lift, sharks will be provided with oxygenated seawater via a mouthpiece and tube.

Once on the lift, internal acoustic tags will be implanted surgically in the coelomic cavity and the incision will be sutured. Smart Position and Temperature (SPOT) tags will be attached on the leading edge of the first dorsal fin by drilling four holes in the dorsal fin with an electric drill and attaching the tag with nylon bolts, stainless steel locknuts and plastic spacers. The hardware is designed to retain the tag for five years after which it will fail and the tag will detach. All White Sharks caught, up to 20, will have both acoustic and SPOT tags applied. Pop-up Archival Satellite Tags (PSAT) will be attached via a tether to a subdermal metal dart implanted in the shark's flank below the first dorsal fin. PSAT tags will be attached to up to 6 White Sharks caught.

The researchers will also collect samples (blood, muscle, semen, fecal and urine samples), conduct skin, gill and cloacal swabs, collect parasites, collect eye and tail measurements, and perform an ultrasound (females). Samples will be collected using a hypodermic puncture and biopsy punch.

The activities authorized by this permit consist of:

- Actively attracting White Sharks to a vessel;
- Catch and release of White Sharks;
- Lifting individuals out of the water on a hydraulic lift;
- Collecting blood and tissue samples;
- Implanting internal acoustic tags; and
- Attaching SPOT and PSAT tags.

The effects that the activity may cause to the listed wildlife species and the effects of those changes authorized by this permit are as follows:

- Harm, harassment, capture and possession of listed aquatic species at risk.



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## Terms and Conditions of Permit

The activity must be carried on in accordance with the following conditions:

### 1. General Conditions

- 1.1. A copy of this permit shall be kept on site at all times in the possession of the Permit Holder or a person acting under the Permit Holder's authority, and shall be made available to an enforcement officer upon request.
- 1.2. All persons undertaking the activity under the authority of the Permit Holder shall do so under the direction and oversight of the Permit Holder and shall be made familiar with the conditions of this permit.
- 1.3. The activity must comply with the conditions identified within this permit. Activities that affect individuals of species at risk, their residences, or their critical habitat, other than those specifically identified within this permit are not authorized under this permit.
- 1.4. No changes to the Permitted activities shall take place without prior consultation with DFO, and written approval from DFO, Species at Risk Management Division. Contact information as follows:

**Species at Risk Management Division**  
**Fisheries and Oceans Canada**  
**80 East White Hills Road**  
**PO Box 5667**  
**St. John's, NL, A1C 5X1**  
**email: [SARANL-LEPTNL@dfo-mpo.gc.ca](mailto:SARANL-LEPTNL@dfo-mpo.gc.ca)**  
**phone: 1-709-772-2443 fax: 1-709-772-5562**

### 2. Conditions to avoid or minimize the impact of the activity on the species:

- 2.1. To the extent possible, activities shall be conducted in a manner whereby any individuals of the species shall be handled only in the circumstances authorized under this permit and with the least amount of harm.
  - 2.2. Activities shall only be conducted in the study area described above. If activities are to be conducted outside the study area, DFO shall be notified in advance using the contact information in condition 1.4.
  - 2.3. Only individuals that are experienced in tagging large pelagic fishes shall tag White Sharks.
  - 2.4. White Sharks shall not be chased by the vessel.
  - 2.5. The following gear shall be used: circle hooks (either 20/0 or 27/0 with zero offset) rigged with a cross bar bit-blocker (30cm up the leader) and attached to a stainless steel wire rope (3/32" or 1/8"). The leader shall be 10m in length and shall be attached to a braid rope with elasticity properties. Leaders shall be embedded inside a three-strand rope to increase the diameter.
  - 2.6. Individual White Sharks shall not be kept on the research platform for longer than 20 minutes.
  - 2.7. While on the research platform, oxygenated seawater shall be pumped through a hose and mouthpiece into the shark's buccal cavity at all times.
  - 2.8. While on the research platform, a tail rope shall be used to prevent the animal from causing harm to itself and others.
  - 2.9. While on the research platform, the animal's head and eyes shall be covered with wet towel to reduce animal stress and keep eyes moist.
  - 2.10. While on the research platform, the animal's skin shall be kept wet.
  - 2.11. While on the research platform animal stress shall be monitored by observing skin colouration, presence of blood pooling, gill movements, and animal activity. If acute stress is observed, the animal shall be released immediately.
  - 2.12. The total time of engagement with a single White Shark from the time it is initially hooked until it is released shall be limited to 40 minutes.
  - 2.13. No more than 20 White Sharks, in total, shall be tagged.
  - 2.14. No attempts shall be made to tag White Sharks that are injured or behaving abnormally.
  - 2.15. Only White Sharks greater than 3.5 metres in total length shall be caught and tagged.
-

- 2.16. A DFO representative shall be onboard as an observer during a subset of the expedition to be determined by DFO.
- 2.17. In the event of a mortality or significant injury being sustained by a White Shark during a tagging attempt, all further attempts at tagging shall cease and DFO shall be contacted immediately using the contact information in condition 1.4. No further attempts at catching or tagging White Sharks shall be resumed until approved by DFO.

**3. Conditions that relate to monitoring and reporting:**

- 3.1. By December 31, 2018, irrespective of whether the Permitted activities took place, a SARA Section 73 Permit Report shall be completed and returned to the Species at Risk Management Division using the contact information provided in condition 1.4. Without limiting the generality of the foregoing, the report shall contain the following information, to the satisfaction of DFO in its sole discretion:
  - 3.1.1. to demonstrate that measures and standards to avoid and mitigate the impacts of the permitted activities on the species were implemented according to the conditions of this permit;
  - 3.1.2. an assessment of whether the measures and standards mentioned in condition 3.1.1 were successful at avoiding and mitigating the impacts of the permitted activities on the species;
  - 3.1.3. details of any contingency measures that were followed to prevent impacts greater than those authorized by this permit;
  - 3.1.4. for any interaction with, or sighting of, a White Shark, report the following: date, time, location, length, size, gender (specify if females are pregnant or not), condition of the individual; and identify if tagging was attempted or undertaken on that individual; and
  - 3.1.5. provide details of any tagging attempts, including whether tagging was successful, unplanned or unexpected impacts on the shark, reaction of the shark to the tagging, and lessons learned.

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**Authorization Limitations and Application Conditions**

This permit cannot be transferred or assigned to another party. If the activity authorized under this permit is sold or transferred to another party, or if other circumstances arise that result in another party taking over the activity, the Permit Holder shall advise DFO in advance if the ownership or responsibility for the activity is expected to change.

The failure to comply with any condition of this permit is an offence under section 97 of SARA and might result in charges being laid under SARA.

This permit may be revoked or amended to ensure the survival or recovery of White Shark. Without limiting the generality of the foregoing, DFO may:

- suspend any permitted activities to avoid or mitigate additional adverse direct or indirect effects to White Sharks;
- amend or revoke this permit; and
- direct the Permit Holder to carry out at the Permit Holder's expense any modifications or actions deemed necessary by DFO to avoid or mitigate existing impacts or to avoid further adverse direct and indirect impacts to White Sharks.

This permit is valid only with activities and species listed herein and for no other purposes. It does not authorize the Permit Holder to kill, buy, sell, or trade an individual of a wildlife species that is listed as extirpated, endangered or threatened, or any part or derivative of such an individual. This permit does not purport to release the Permit Holder from any obligation to obtain permission from or to comply with the requirements of any other regulatory agencies.

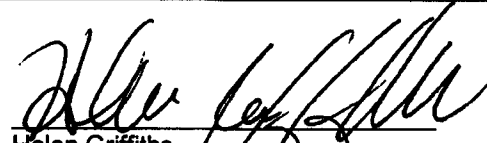
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Date of Issue: 2018-04-30

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Signature of authorizing officer:



Helen Griffiths  
Regional Manager, Species at Risk  
Newfoundland and Labrador Region  
Fisheries and Oceans Canada  
80 East White Hills Road, PO Box 5667, St. John's NL A1C 5X1

Further information about this permit is available from the above authorizing officer ([Helen.Griffiths@dfo-mpo.gc.ca](mailto:Helen.Griffiths@dfo-mpo.gc.ca)).

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## **MacDonald, Jennifer**

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**From:** MacDonald, Jennifer  
**Sent:** May-02-18 8:21 AM  
**To:** Humphrey, Donald  
**Subject:** RE: FOR INPUT: 2018-001-00756 Eyre to K. Curlett by May 7

Hi Donald,

The incoming letter is asking for information on how to apply for a Marine Mammal Transportation Permit, which I think would be done by Resource Management. I think RM may be better placed to respond? OCEARCH had previously asked me for information on how to obtain this permit, but I hadn't managed to track down that information for them yet.  
Jenn

**Jennifer MacDonald**  
Species at Risk Management Division  
(902) 407-8175

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**From:** Humphrey, Donald  
**Sent:** May-01-18 7:51 PM  
**To:** MacDonald, Jennifer  
**Subject:** FW: FOR INPUT: 2018-001-00756 Eyre to K. Curlett by May 7  
**Importance:** High

Can you please develop a response for Friday? Let me know if you have any questions.

Thanks, Donald

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**From:** King, Rhea L  
**Sent:** May-01-18 11:31 AM  
**To:** Humphrey, Donald  
**Cc:** Dunn, Andy  
**Subject:** FW: FOR INPUT: 2018-001-00756 Eyre to K. Curlett by May 7

For review and input. As well, can you please advise if this should also go to RM?

Thanks,  
Rhea

---

**From:** Curlett, Karen A  
**Sent:** May-01-18 10:29 AM  
**To:** King, Rhea L  
**Cc:** Dunn, Andy  
**Subject:** FOR INPUT: 2018-001-00756 Eyre to K. Curlett by May 7

Hi Rhea. For draft reply please due back to me for RDG approval Monday May 7<sup>th</sup>.  
thank you  
Karen

**From:** Maloney, Barbara  
**Sent:** Monday, April 30, 2018 6:00 PM

**To:** Curlett, Karen A <Karen.Curlett@dfo-mpo.gc.ca>

**Subject:** FOR INPUT: 2018-001-00756 Eyre to K. Curlett by May 7

Hi Karen,

The attached docket concerns the application process for a Marine Mammal Transportation Permit in order to allow the correspondent to research white sharks in Canadian waters around Nova Scotia and Newfoundland.

Could you please provide input and any necessary revisions by **May 7**.

Please note that previous correspondence from this organization (OCEARCH), regarding a Species at Risk research permit, can be found in docket **2017-001-02427** (Main Docs attached).

If you are not the correct contact person, please advise me of the correct contact person as soon as possible so I can redirect my request.

Thanks very much,

Barbara Maloney  
Writer/Editor, Ministerial Correspondence Control Unit  
Fisheries and Oceans Canada / Government of Canada  
[barbara.maloney@dfo-mpo.gc.ca](mailto:barbara.maloney@dfo-mpo.gc.ca)

Rédactrice-révisure, Unité du contrôle de la correspondance ministérielle  
Pêches et Océans Canada / Gouvernement du Canada  
[barbara.maloney@dfo-mpo.gc.ca](mailto:barbara.maloney@dfo-mpo.gc.ca)

[XNCR-GrpCW/RC@dfo-mpo.gc.ca](mailto:XNCR-GrpCW/RC@dfo-mpo.gc.ca) to contact all MCCU Writers / pour rejoindre tous les rédacteurs d'UCCM  
[XNCR-GrpCA/AC@dfo-mpo.gc.ca](mailto:XNCR-GrpCA/AC@dfo-mpo.gc.ca) to contact all MCCU Analysts / pour rejoindre tous les analystes d'UCCM

## **MacDonald, Jennifer**

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**From:** MacDonald, Jennifer  
**Sent:** May-09-18 9:31 AM  
**To:** Spence, Koren R  
**Subject:** RE: White shark s. 73

Yes – they are looking for information on what is needed to use the marine mammal material in their chum.

**Jennifer MacDonald**  
Species at Risk Management Division  
(902) 407-8175

---

**From:** Spence, Koren R  
**Sent:** May-09-18 9:30 AM  
**To:** MacDonald, Jennifer  
**Subject:** RE: White shark s. 73

Nope! Just wanted to check. There was confusion at RM NHQ related to a request for a marine mammal transport permit for the same group. NHQ thought they were looking for a SARA permit related to working on white shark...our interpretation is that no...they want a permit that will allow them to collect or transport blubber from dead whales and use it to attract sharks.

Since they already have a SARA permit, that resolves the question of what exactly they are looking for. THANKS!

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**From:** MacDonald, Jennifer  
**Sent:** May-09-18 9:28 AM  
**To:** Spence, Koren R  
**Subject:** RE: White shark s. 73

They have...do you want to see the permit and conditions?

**Jennifer MacDonald**  
Species at Risk Management Division  
(902) 407-8175

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**From:** Spence, Koren R  
**Sent:** May-09-18 9:25 AM  
**To:** MacDonald, Jennifer  
**Subject:** White shark s. 73

Hey,  
Can you tell me if OCEARCH has been issued a s.73 permit to do work on white shark in 2018?

## **MacDonald, Jennifer**

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**From:** Sullivan, Katrina  
**Sent:** May-16-18 2:00 PM  
**To:** MacDonald, Jennifer  
**Subject:** OSEARCH permit rational NLSAR-001-18 V2.doc  
**Attachments:** OSEARCH permit rational NLSAR-001-18 V2.doc

**Follow Up Flag:** Follow up  
**Flag Status:** Completed

Please find attached for your review the rationale for the OSEARCH Permit. As discussed, please let me know any errors or oversights. Thank you.

### **Katrina Sullivan**

Senior Biologist

Species at Risk | Espèces en Péril  
Ecosystems Management | Gestion des écosystèmes  
Fisheries and Oceans Canada | Pêches et Océans Canada  
Northwest Atlantic Fisheries Centre |  
Centre des Pêches de l'Atlantique Nord-Ouest  
80 East White Hills Road | 80, route White Hills est  
PO Box 5667 | CP 5667  
St. John's NL A1C 5X1 Canada

Telephone | Téléphone: (709) 772-0115  
Fax | Télécopieur: (709) 772-5562  
[Katrina.Sullivan@dfo-mpo.gc.ca](mailto:Katrina.Sullivan@dfo-mpo.gc.ca)

**Regional or Local Number:** NLSAR-001-18 (PATH: 17-PNFL-00020)  
DFO-MAR-2017-17 (PATH: 17-PMAR-00018)

**Explanation for:** SARA Permit

Notice is hereby given that pursuant to the provisions of section 73 of the *Species at Risk Act* permits No. NLSAR-001-18, and No. DFO-MAR-2017-17 are issued.

**Start or Issue Date:** 2018-08-01  
**End or Expiry Date:** 2018-11-30

**Purpose:**

The activity is scientific research relating to the conservation of the species and conducted by qualified persons.

**English Description of Activity**

The purpose of the activity is to conduct scientific research on White Sharks in Canadian waters to gain a better understanding of the role of Canadian waters in the life history of the White Shark population in the northwest Atlantic Ocean, the range of the species within Canadian waters and health of White Sharks. The researchers will attach acoustic and satellite tags, as well as collect various biological samples, from up to 20 sharks in Canadian waters.

Researchers will use chum to attract White Sharks in the study area to the fishing boat and larger research vessel. When a White Shark is sighted, either visually or using a drone, the fishing boat will target its fishing activities to attract and capture that shark. Chum bags, chum boxes, bait tanks, chum tubes and decoys may all be used to attract White Sharks to the fishing vessel. Once a White Shark is in the vicinity of the fishing vessel, the researchers will attempt to catch the shark using a 20/0 circle hook (zero offset) with a bite-blocker attached. In the case of a very large White Shark, a 27/0 circle hook (zero offset) with a buoy to prevent swallowing of the hook will be used. Once caught, the White Shark will be guided onboard the hydraulic lift on the research vessel, which will then raised above the waterline. While on the lift, sharks will be provided with oxygenated seawater via a mouthpiece and tube.

Once on the lift, internal acoustic tags will be implanted surgically in the coelomic cavity and the incision will be sutured. Smart Position and Temperature (SPOT) tags will be attached on the leading edge of the first dorsal fin by drilling four holes in the dorsal fin with an electric drill and attaching the tag with nylon bolts, stainless steel locknuts and plastic spacers. The hardware is designed to retain the tag for five years after which it will fail and the tag will detach. All White Sharks caught, up to 20, will have both acoustic and SPOT tags applied. Pop-up Archival Satellite Tags (PSAT) will be attached via a tether to a subdermal metal dart implanted in the shark's flank below the first dorsal fin. PSAT tags will be attached to up to 6 White Sharks caught.

The researchers will also collect samples (blood, muscle, semen, fecal and urine samples), conduct skin, gill and cloacal swabs, collect parasites, collect eye and tail measurements, and perform an ultrasound (females). Samples will be collected using a hypodermic puncture and



biopsy punch.

The activities authorized by the permits include:

- Actively attracting White Sharks to a vessel;
- Catch and release of White Sharks
- Lifting individuals out of the water on a hydraulic lift;
- Collecting blood and tissue samples;
- Implanting internal acoustic tags; and
- Attaching SPOT and PSAT tags.

### **French Description of Activity**

<French Translations is required for the information presented in the previous section.>

### **Issuing Authority**

Fisheries and Oceans Canada NL Region and Maritimes Region

### **Authority Used**

*Species at Risk Act*

### **English Pre-Conditions:**

#### **a) Alternatives**

The proposed activities aim to answer a number of research questions, both through the tracking of individual White Sharks that will be tagged and through analysis on blood and other tissue samples. Scientific research to better understand White Shark population dynamics, distribution and habitat use and to collect and maintain White Shark sightings information are high priority areas for research. This planned research project is consistent with the research and management approaches included in the draft recovery strategy for this species.

The planned use of circle hooks to capture White Sharks will reduce the risk of foul hooking. In general, sharks are capable of recovery from physiological stress associated with capture; mortality due to capture is not anticipated. With respect to the planned lifting of captured sharks out of the water and onto the sampling lift, the risk of internal injury related to this aspect of the planned study is likely to be low. The researchers have taken blood samples from White Sharks in previous research programs (up to 120 animals) and it has been shown that stress levels remain low within captured White Sharks. The volume of blood to be collected during the planned research is in keeping with *Canadian Council on Animal Care Guidelines on Care and Use of Fish in Research*. In terms of physical injury associated with the tagging, shark species in general are very resilient to superficial cuts and have a tremendous capacity to heal from injury. As such the tagging site is expected to heal quickly with minimal effect on the tagged individual. Post-release behavioural studies during previous White Shark research programs have shown recovery and resumption of natural swimming behaviour by sharks within approximately 6 hours after release.

In relation to the proposed activities, overall the applicant asserts that the methods and procedures proposed are the safest and most successful way of obtaining the necessary samples

and attaching SPOT tags. There are no alternative locations to conduct the research, as it must be conducted within the range of the species.

The proposed activities are the best means to gather the anticipated information and data. The likelihood of mortality will be low.

#### **b) Measures to minimize impact**

Research personnel are experienced in the study, capture and recovery of White Sharks using the methods planned for this research program. The following measures will be implemented to minimize impacts of planned research activities:

- Individuals will not be chased by the vessel, but will be attracted using chum;
- Gear will be used that will minimize the chance that animals are gut-hooked (including using circle hooks and a crossbar bite-blocker);
- Animal struggles and injury will be minimized by:
  - using a leader attached to a braid rope with elasticity properties to help reduce hard shock during the initial struggle;
  - using a 10 m leader length in case the shark rolls in the line to ensure that the shark cannot bite through the rope and escape (retaining the hook and leader);
  - embedding the leader inside a three-strand rope to give it a thicker diameter so that if the shark rolls, the thicker rope does not cut into the sharks' skin and is easier to unwrap;
  - using heavier tackle that keeps enough pressure on the shark so that the line is stretched tight and the shark cannot turn and roll.
- All research procedures will be conducted within 20 minutes of the White Shark being placed on the research platform;
- While on the research platform:
  - oxygenated seawater will be pumped through a hose and mouthpiece (allowing for simultaneous flushing of the gills on both sides of the head) into the shark's buccal cavity at all times;
  - a tail rope will be used to prevent the animal from causing harm to itself and others;
  - the head and eyes will be covered with wet terrycloth towel to reduce stress and keep eyes moist;
  - skin will be kept wet during in-air procedures to prevent drying;
  - animal stress will be monitored by observing skin colouration, presence of blood pooling, gill movements, and animal activity;
  - if stress is detected in the animal, a blood sample will be taken to evaluate the shark's conditions;
  - if acute stress is observed, the animal will be released immediately.

#### **c) Effects on survival and recovery**

The proposed activities will not jeopardize survival or recovery of the listed species due to low risk of long term or permanent injury or death and will not impact on the species' habitats or prey. No mortality is expected. As such it is unlikely that White Shark recovery will be compromised.

**French Pre-Conditions:**

**a) Solutions de rechange**

<French Translation is required for Section a above>

**b) Mesures visant à réduire au minimum les impacts**

<French Translation is required for Section b above>

**c) Effets sur la survie ou le rétablissement de l'espèce**

<French Translation is required for Section c above>

**English Terms and Conditions**

The activities must be carried out in accordance with the following conditions:

**General Conditions:**

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**Terms and Conditions of Permit**

The activity must be carried on in accordance with the following conditions:

**1. General Conditions**

- 1.1. A copy of this permit shall be kept on site at all times in the possession of the Permit Holder or a person acting under the Permit Holder's authority, and shall be made available to an enforcement officer upon request.
- 1.2. All persons undertaking the activity under the authority of the Permit Holder shall do so under the direction and oversight of the Permit Holder and shall be made familiar with the conditions of this permit.
- 1.3. The activity must comply with the conditions identified within this permit. Activities that affect individuals of species at risk, their residences, or their critical habitat, other than those specifically identified within this permit are not authorized under this permit.
- 1.4. No changes to the Permitted activities shall take place without prior consultation with DFO, and written approval from DFO, Species at Risk Management Division. Contact information as follows:

**Species at Risk Management Division**  
**Fisheries and Oceans Canada**  
**80 East White Hills Road**  
**PO Box 5667**  
**St. John's, NL, A1C 5X1**  
**email: [SARANL-LEPTNL@dfo-mpo.gc.ca](mailto:SARANL-LEPTNL@dfo-mpo.gc.ca)**  
**phone: 1-709-772-2443      fax: 1-709-772-5562**

**2. Conditions to avoid or minimize the impact of the activity on the species:**

- 2.1. To the extent possible, activities shall be conducted in a manner whereby any individuals of the species shall be handled only in the circumstances authorized under this permit and with the least amount of harm.
- 2.2. Activities shall only be conducted in the study area described above. If activities are to be conducted outside the study area, DFO shall be notified in advance using the contact information in condition 1.4.
- 2.3. Only individuals that are experienced in tagging large pelagic fishes shall tag White Sharks.
- 2.4. White Sharks shall not be chased by the vessel.
- 2.5. The following gear shall be used: circle hooks (either 20/0 or 27/0 with zero offset) rigged with a cross bar bit-blocker (30cm up the leader) and attached to a stainless steel wire rope (3/32" or 1/8"). The leader shall be 10m in length and shall be attached to a braid rope with elasticity properties. Leaders shall be embedded inside a three-strand rope to increase the diameter.
- 2.6. Individual White Sharks shall not be kept on the research platform for longer than 20 minutes.
- 2.7. While on the research platform, oxygenated seawater shall be pumped through a hose and mouthpiece into the shark's buccal cavity at all times.
- 2.8. While on the research platform, a tail rope shall be used to prevent the animal from causing harm to itself and others.
- 2.9. While on the research platform, the animal's head and eyes shall be covered with wet towel to reduce animal stress and keep eyes moist.
- 2.10. While on the research platform, the animal's skin shall be kept wet.
- 2.11. While on the research platform animal stress shall be monitored by observing skin colouration, presence of blood pooling, gill movements, and animal activity. If acute stress is observed, the animal shall be released immediately.
- 2.12. The total time of engagement with a single White Shark from the time it is initially hooked until it is released shall be limited to 40 minutes.
- 2.13. No more than 20 White Sharks, in total, shall be tagged.
- 2.14. No attempts shall be made to tag White Sharks that are injured or behaving abnormally.
- 2.15. Only White Sharks greater than 3.5 metres in total length shall be caught and tagged.
- 2.16. A DFO representative shall be onboard as an observer during a subset of the expedition to be determined by DFO.
- 2.17. In the event of a mortality or significant injury being sustained by a White Shark during a tagging attempt, all further attempts at tagging shall cease and DFO shall be contacted immediately using the contact information in condition 1.4. No further attempts at catching or tagging White Sharks shall be resumed until approved by DFO.

**3. Conditions that relate to monitoring and reporting:**

- 3.1. By December 31, 2018, irrespective of whether the Permitted activities took place, a SARA Section 73 Permit Report shall be completed and returned to the Species at Risk Management Division using the contact information provided in condition 1.4. Without limiting the generality of the foregoing, the report shall contain the following information, to the satisfaction of DFO in its sole discretion:
    - 3.1.1. to demonstrate that measures and standards to avoid and mitigate the impacts of the permitted activities on the species were implemented according to the conditions of this permit;
    - 3.1.2. an assessment of whether the measures and standards mentioned in condition 3.1.1 were
-

- successful at avoiding and mitigating the impacts of the permitted activities on the species;
- 3.1.3. details of any contingency measures that were followed to prevent impacts greater than those authorized by this permit;
- 3.1.4. for any interaction with, or sighting of, a White Shark, report the following: date, time, location, length, size, gender (specify if females are pregnant or not), condition of the individual; and identify if tagging was attempted or undertaken on that individual; and
- 3.1.5. provide details of any tagging attempts, including whether tagging was successful, unplanned or unexpected impacts on the shark, reaction of the shark to the tagging, and lessons learned.
- 

### **French Terms and Conditions (optional)**

L'activité doit être exercée conformément aux conditions suivantes:

#### **Conditions générales:**

<French Translation of information provided above in the section titled "General Conditions" is required here>

#### **Conditions à respecter pour éviter ou minimiser les conséquences négatives des activités sur l'espèce:**

<French Translation of information provided above in the section titled "Conditions to avoid or minimize the impact of the activities on the species" is required here>

#### **Conditions relatives à la surveillance et à la production de rapports:**

<French Translation of information provided above in the section titled "Conditions that relate to monitoring and reporting" is required here>

### **English Other Relevant Information (optional)**

### **French Other Relevant Information (optional)**

#### **Locations of Activity:**

*Newfoundland and Labrador:*

- *South Coast - Placentia Bay (47° 05.00' N / 54° 32.00' W)*

*Nova Scotia:*

- *Mahone Bay (44° 29.50' N / 64° 13.50' W and adjacent areas*
- *Bay of Fundy (44° 54.00' N / 66° 32.50' W and adjacent areas; and*
- *Sable Island (43° 56.14' N / 59° 56.59' W)*

#### **Affected Species**

<b>Common Name</b>	<b><i>Scientific name/Nom scientifique</i></b>
White shark (Atlantic population)	<i>Carcharodon carcharias</i>

**Contact Information**

Species at Risk Program

Fisheries and Oceans Canada – NL Region

PO Box 5667 St. John's NL A1C 5X1

Telephone: 709-772-2443

Fax: 709-772-5562

[SARANL-LEPTNL@dfo-mpo.gc.ca](mailto:SARANL-LEPTNL@dfo-mpo.gc.ca)

Species at Risk Management Division

Fisheries and Oceans Canada – Maritimes Region

P. O. Box 1006 Dartmouth NS B2Y 4A2

Telephone: 1-866-891-0771

Fax: 902-426-2331

[SpeciesatRisk.xmar@dfo-mpo.gc.ca](mailto:SpeciesatRisk.xmar@dfo-mpo.gc.ca)

**MacDonald, Jennifer**

---

**From:** Hastings, Katherine  
**Sent:** May-17-18 10:54 AM  
**To:** Sweet, Marilyn  
**Cc:** Merriman, Catherine B; MacDonald, Jennifer  
**Subject:** FW: OCEARCH questions - right whale research connections, permits, in Canada

Hi Marilyn,

Please see below. Cathy can fill you in. OCEARCH needs info on marine mammal permits for shark chum. If you could respond asap that would be great – I am under the impression that they've been trying to track down this info for a while.

Thanks,  
 Katie

---

**From:** Hastings, Katherine  
**Sent:** May-17-18 10:52 AM  
**To:** 'Robert Hueter'  
**Cc:** Merriman, Catherine B; chris@oceanarch.org; Moors-Murphy, Hilary; Gromack, Aimee; ameite@oceanarch.org; Vanderlaan, Angelia S.; MacDonald, Jennifer  
**Subject:** RE: OCEARCH questions - right whale research connections, permits, in Canada

Hi Bob,

That falls under the mandate of our Fisheries Management Branch. I have spoken with them, and they will be in touch soon with more details.

Katie

---

**From:** Robert Hueter [mailto:rhuetter@mote.org]  
**Sent:** May-17-18 10:27 AM  
**To:** Hastings, Katherine  
**Cc:** Merriman, Catherine B; chris@oceanarch.org; Moors-Murphy, Hilary; Gromack, Aimee; ameite@oceanarch.org; Vanderlaan, Angelia S.  
**Subject:** Re: OCEARCH questions - right whale research connections, permits, in Canada

Thanks Katie, we're looking to connect with those who can assist us with obtaining a marine mammal permit and whale blubber from dead, stranded animals, to attract white sharks for our research, analogous to our NOAA permit and contacts within the NE US Stranding Network. Who is best to discuss that with us? We already have our SARA permit for the white shark research using these methods.

Bob Hueter

On May 17, 2018, at 8:43 AM, Hastings, Katherine <[Katherine.Hastings@dfo-mpo.gc.ca](mailto:Katherine.Hastings@dfo-mpo.gc.ca)> wrote:

Hi Bob,

Thanks for your message. With respect to research collaborations, it would be best if you spoke with someone in our Science Branch.

Angelia Vanderlaan might have availability before then. I have added her to this correspondence. If you have any questions about the Species at Risk Program (e.g. recovery

documents, permitting), please let me know. All published right whale recovery documents can be found here: [http://www.sararegistry.gc.ca/species/speciesDetails\\_e.cfm?sid=780#docs](http://www.sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=780#docs)

Best,  
Katie

### Katherine Hastings

Species at Risk Management Division  
Fisheries and Oceans Canada / Government of Canada  
[katherine.hastings@dfo-mpo.gc.ca](mailto:katherine.hastings@dfo-mpo.gc.ca) / Tel: 902-401-0070 / Fax: 902-426-2331

Division de la gestion des espèces en péril  
Pêches et Océans Canada / Gouvernement du Canada  
[katherine.hastings@dfo-mpo.gc.ca](mailto:katherine.hastings@dfo-mpo.gc.ca) / Tél: 902-401-0070 / Téléc: 902-426-2331

---

**From:** Robert Hueter [<mailto:rhueter@mote.org>]  
**Sent:** May-17-18 9:30 AM  
**To:** Merriman, Catherine B  
**Cc:** [chris@oceanarch.org](mailto:chris@oceanarch.org); Hastings, Katherine; Moors-Murphy, Hilary; Gromack, Aimee; [ameite@oceanarch.org](mailto:ameite@oceanarch.org)  
**Subject:** Re: OCEARCH questions - right whale research connections, permits, in Canada

Thanks so much, Cathy. Excited about the opportunities to help you with right whale research this autumn! Obviously there's a dynamic interaction between right whales and white sharks. We're happy to help in any way possible.

Katie, can we discuss marine mammal needs for our shark research ASAP? Please let us know of your availability for a phone call, which we can arrange.

Bob Hueter

On May 16, 2018, at 12:21 PM, Merriman, Catherine B <[Catherine.Merriman@dfo-mpo.gc.ca](mailto:Catherine.Merriman@dfo-mpo.gc.ca)> wrote:

Hi Dr. Hueter,

I got your voice messages. Sorry you were not able to e-mail me – it sounds like you had my address correct. My mailbox filled up suddenly yesterday as a lot of images were being shared, and we have size limits on our inboxes. I have fixed that for now! I did also get a call from Chris Fischer, and we had a quick chat this morning.

In my regular job with DFO I lead the Species at Risk Act (SARA) recovery file for the north Atlantic right whale, in the Ecosystem Management Branch (policy). I have just started a temporary assignment in our Fisheries Management Branch, to help with the right whale file for a few months.

So by this e-mail, I will connect you with my colleague Katie Hastings who is managing the right whale recovery file while I am on assignment, and Hilary Moors-Murphy in our Science Branch who leads DFO's whale field research program. If you had called a week earlier, we could have had you join last week's meeting / conference call to coordinate all of the right whale fieldwork activities coming up this year in Atlantic Canada, with all of the organizations in Canada and the U.S. planning fieldwork. Hilary is well-placed to identify potential collaboration opportunities. At the least, if your vessel will be in



Newfoundland and Nova Scotia waters in the autumn, that is an opportunity for the OCEARCH crew to be on the lookout for right whales and to provide good quality sightings data and photos. Katie can help steer you toward answers about SARA permitting, including for the potential possession and use of right whale remains.

I am also making note of your offer to provide vessel support in the event that a right whale carcass is discovered offshore, and will include it in contingency planning information.

I hope that helps for now, Thanks,  
Cathy

**Cathy Merriman MSc**

A\Senior Advisor | Conseillère principale  
Fisheries Management | Gestion des pêches Maritimes Region | Région des Maritimes  
Fisheries and Oceans Canada | Pêches et Océans Canada  
1 Challenger Dr | 1 promenade Challenger  
PO Box 1006 | C.P. 1006  
Dartmouth, NS Canada B2Y 4A2 | Dartmouth, NÉ Canada B2Y 4A2  
(902)-401-8437  
[catherine.merriman@dfo-mpo.gc.ca](mailto:catherine.merriman@dfo-mpo.gc.ca)

## MacDonald, Jennifer

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**From:** Chris Fischer <chris@oearch.org>  
**Sent:** May-17-18 2:05 PM  
**To:** Hastings, Katherine  
**Cc:** Robert Hueter; Merriman, Catherine B; Moors-Murphy, Hilary; Gromack, Aimee; Ami Meite; Vanderlaan, Angelia S.; MacDonald, Jennifer  
**Subject:** Re: OCEARCH questions - right whale research connections, permits, in Canada  
**Attachments:** Oearch parts authorization letter.pdf

I have attached our current NOAA Marine Mammal Parts Authorization.  
The one Bob sent was our previous permit that had expired.  
Grateful for all the help,  
chris

**CHRIS FISCHER** | Expedition Leader | Founding Chairman  
**P: 435.645.8990 | F: 435.645.7077 | BE**  
**ENGAGED: OCEARCH.ORG**

**OCEARCH** |

EDUCATE

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On May 17, 2018, at 10:34 AM, Hastings, Katherine <[Katherine.Hastings@dfo-mpo.gc.ca](mailto:Katherine.Hastings@dfo-mpo.gc.ca)> wrote:

Hi Bob,

The urgency of your request has been conveyed to the appropriate advisors. If you have not heard anything further by next week (note that Monday is a holiday in Canada), please let me know and I will follow up on your behalf.

Thanks,  
Katie

---

**From:** Robert Hueter [<mailto:rhueter@mote.org>]  
**Sent:** May-17-18 11:36 AM  
**To:** Hastings, Katherine  
**Cc:** Merriman, Catherine B; [chris@oearch.org](mailto:chris@oearch.org); Moors-Murphy, Hilary; Gromack, Aimee; [ameite@oearch.org](mailto:ameite@oearch.org); Vanderlaan, Angelia S.; MacDonald, Jennifer  
**Subject:** Re: OCEARCH questions - right whale research connections, permits, in Canada

OK Katie, please we need to move on this quickly, as we realize the permitting process can take some time and our expedition is planned for September. Attached is the analogous permit granted to us by NOAA, feel free to provide this up the line to the proper authorities for their information to assist.

Standing by -

Bob

**ROBERT E. HUETER, Ph.D.**

*Senior Scientist & Director, Center for Shark Research  
Perry W. Gilbert Chair in Shark Research  
Manager, Sharks & Rays Conservation Research Program  
Mote Marine Laboratory  
1600 Ken Thompson Parkway  
Sarasota, FL 34236 USA*

[rhuetter@mote.org](mailto:rhuetter@mote.org)

Tel: 941-388-1827

Fax: 941-388-4312

More info at: [www.mote.org](http://www.mote.org)

On 5/17/2018 9:51 AM, Hastings, Katherine wrote:

Hi Bob,

That falls under the mandate of our Fisheries Management Branch. I have spoken with them, and they will be in touch soon with more details.

Katie

---

**From:** Robert Hueter [<mailto:rhuetter@mote.org>]

**Sent:** May-17-18 10:27 AM

**To:** Hastings, Katherine

**Cc:** Merriman, Catherine B; [chris@ocearch.org](mailto:chris@ocearch.org); Moors-Murphy, Hilary; Gromack, Aimee; [ameite@ocearch.org](mailto:ameite@ocearch.org); Vanderlaan, Angelia S.

**Subject:** Re: OCEARCH questions - right whale research connections, permits, in Canada

Thanks Katie, we're looking to connect with those who can assist us with obtaining a marine mammal permit and whale blubber from dead, stranded animals, to attract white sharks for our research, analogous to our NOAA permit and contacts within the NE US Stranding Network. Who is best to discuss that with us? We already have our SARA permit for the white shark research using these methods.

Bob Hueter

On May 17, 2018, at 8:43 AM, Hastings, Katherine <[Katherine.Hastings@dfo-mpo.gc.ca](mailto:Katherine.Hastings@dfo-mpo.gc.ca)> wrote:

Hi Bob,

Thanks for your message. With respect to research collaborations, it would be best if you spoke with someone in our Science Branch.

Angelia Vanderlaan might have availability before then. I have added her to this correspondence. If you have any questions about the Species at Risk Program (e.g. recovery documents, permitting), please let me know. All published right whale recovery documents can be found

here: [http://www.sararegistry.gc.ca/species/speciesDetails\\_e.cfm?sid=780#docs](http://www.sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=780#docs)

Best,  
Katie

### **Katherine Hastings**

Species at Risk Management Division  
Fisheries and Oceans Canada / Government of Canada  
[katherine.hastings@dfo-mpo.gc.ca](mailto:katherine.hastings@dfo-mpo.gc.ca) / Tel: 902-401-0070 / Fax: 902-426-2331

Division de la gestion des espèces en péril  
Pêches et Océans Canada / Gouvernement du Canada  
[katherine.hastings@dfo-mpo.gc.ca](mailto:katherine.hastings@dfo-mpo.gc.ca) / Tél: 902-401-0070 / Téléc: 902-426-2331

---

**From:** Robert Hueter [<mailto:rhoeter@mote.org>]  
**Sent:** May-17-18 9:30 AM  
**To:** Merriman, Catherine B  
**Cc:** [chris@oceanarch.org](mailto:chris@oceanarch.org); Hastings, Katherine; Moors-Murphy, Hilary; Gromack, Aimee; [ameite@oceanarch.org](mailto:ameite@oceanarch.org)  
**Subject:** Re: OCEARCH questions - right whale research connections, permits, in Canada

Thanks so much, Cathy. Excited about the opportunities to help you with right whale research this autumn! Obviously there's a dynamic interaction between right whales and white sharks. We're happy to help in any way possible.

Katie, can we discuss marine mammal needs for our shark research ASAP? Please let us know of your availability for a phone call, which we can arrange.

Bob Hueter

On May 16, 2018, at 12:21 PM, Merriman, Catherine B  
<[Catherine.Merriman@dfo-mpo.gc.ca](mailto:Catherine.Merriman@dfo-mpo.gc.ca)> wrote:

Hi Dr. Hueter,

I got your voice messages. Sorry you were not able to e-mail me – it sounds like you had my address correct. My mailbox filled up suddenly yesterday as a lot of images were being shared, and we have size limits on our inboxes. I have fixed that for now! I did also get a call from Chris Fischer, and we had a quick chat this morning.

In my regular job with DFO I lead the Species at Risk Act (SARA) recovery file for the north Atlantic right whale, in the Ecosystem Management Branch (policy). I have

just started a temporary assignment in our Fisheries Management Branch, to help with the right whale file for a few months.

So by this e-mail, I will connect you with my colleague Katie Hastings who is managing the right whale recovery file while I am on assignment, and Hilary Moors-Murphy in our Science Branch who leads DFO's whale field research program. If you had called a week earlier, we could have had you join last week's meeting / conference call to coordinate all of the right whale fieldwork activities coming up this year in Atlantic Canada, with all of the organizations in Canada and the U.S. planning fieldwork. Hilary is well-placed to identify potential collaboration opportunities. At the least, if your vessel will be in Newfoundland and Nova Scotia waters in the autumn, that is an opportunity for the OCEARCH crew to be on the lookout for right whales and to provide good quality sightings data and photos. Katie can help steer you toward answers about SARA permitting, including for the potential possession and use of right whale remains.

I am also making note of your offer to provide vessel support in the event that a right whale carcass is discovered offshore, and will include it in contingency planning information.

I hope that helps for now, Thanks,  
Cathy

**Cathy Merriman MSc**

A\Senior Advisor | Conseillère principale  
Fisheries Management | Gestion des pêches Maritimes  
Region | Région des Maritimes Fisheries and Oceans  
Canada | Pêches et Océans Canada  
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Dartmouth, NS Canada B2Y 4A2 | Dartmouth, NE  
Canada B2Y 4A2  
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[catherine.merriman@dfo-mpo.gc.ca](mailto:catherine.merriman@dfo-mpo.gc.ca)



**UNITED STATES DEPARTMENT OF COMMERCE**

National Oceanic and Atmospheric Administration

**NATIONAL MARINE FISHERIES SERVICE**

Southeast Regional Office

263 13th Avenue South

St. Petersburg, Florida 33701-5505

<http://sero.nmfs.noaa.gov>

**2/8/2017**

**F/SER32:EF**

Chris Fischer  
OCEARCH  
PO Box 584425  
Park City, UT 84068

Dear Mr. Fischer:

NOAA's National Marine Fisheries Service (NMFS) has reviewed your request for authorization to receive blubber, muscle, skin, tongue, and liver collected from stranded marine mammal species (including baleen whales, toothed whales, and seals) by NMFS's Southeast Region and Greater Atlantic Marine Mammal Stranding Network. The samples will be used for scientific research studies on sharks, which, in addition to the shark research, will include investigations on the linkage between shark ecology and their marine mammal prey.

The information provided about your research in your written correspondence is sufficient to satisfy the Marine Mammal Protection Act (MMPA) requirements for transfer of marine mammal parts at this time. The MMPA's implementing regulations at 50 CFR 216.22 and 216.37 (enclosed) authorize the transfer of marine mammal parts if:

- (1) The person/agency transferring the part does not receive payment for the part;
- (2) the marine mammal part is transferred for scientific research purposes, curation in a professionally accredited scientific collection, or educational objectives; and
- (3) an accession number, authorized or assigned by NMFS, is affixed to the marine mammal part. In most cases, this is the field number assigned by the Marine Mammal Stranding Network.

Pursuant to 50 CFR 216.22 and 216.37, this letter authorizes you, Chris Fischer, to possess/receive blubber, muscle, skin, tongue, and liver from baleen whales, toothed whales, and seals collected by NMFS's Southeast Region and Greater Atlantic Marine Mammal Stranding Network. You are ultimately responsible for the marine mammal parts obtained under this authorization. Personnel that are also authorized to handle the marine mammal parts during research or transport include Brett McBride, Brandon Eyre, Todd Goggins, Dr. Robert Hueter, Bryan Frazier, Dr. James Gelsleichter, Dr. Greg Stunz, Cynthia Gallo, Leo Jefferson, and Jack Morris.

The following additional conditions apply to this authorization:

- 1) Notification must be provided to the NMFS Southeast Regional Office (SERO) (Erin Fougères; [erin.fougères@noaa.gov](mailto:erin.fougères@noaa.gov)) two-weeks prior to research operations. This notification must include the marine mammal species, field numbers, stranding location,



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and samples that may be used during that expedition. For the February 2017 expedition only, notice one week prior will be accepted.

- 2) The authorized marine mammal parts may not be offered to sharks for feeding or consumption, will not be ingested by sharks, and pieces of tissue will not be thrown overboard to attract sharks.
- 3) Efforts to lure, capture, or tag sharks will not occur in close proximity (within two miles) of endangered whale species. This requires an observer on board to regularly scan for the presence of whales as well as subscribing to NMFS Whale alerts to receive near real time locations of endangered North Atlantic right whales (*Eubalaena glacialis*).
- 4) Marine mammal parts (including tissue, oil, and blood) must only be used in the U.S. ocean basin and within the stock boundary, as portrayed in NMFS's stock assessment report (<http://www.nmfs.noaa.gov/pr/sars/species.htm>), of the marine mammal from which the part originated and cannot leave U.S. waters. Thus, only parts from species found in the North Atlantic Ocean may be used in the North Atlantic and cannot be used in any other area. In addition, parts collected in the Gulf of Mexico (GoM) may only be used in the GoM. This is an important safeguard against the inadvertent introduction of diseases or pathogens into the marine environment.
- 5) NMFS reserves the right to further restrict the use of marine mammal parts and their oil within the Regional area from which they were collected (e.g., *if required*, marine mammal parts from the Greater Atlantic Regional Stranding Network could only be used within the boundaries of the Greater Atlantic Region (Maine-Virginia), and parts from the Southeast Region Stranding Network could only be used within the boundaries of the Southeast (North Carolina-Florida in the Atlantic, and Florida-Texas in the GoM). NMFS may further restrict the geographic scope to specific state waters as new information or concerns arise.
- 6) In the event of an Unusual Mortality Event (UME), you may be required to perform specific testing on tissues (e.g., for specific diseases) prior to use, or discontinue use of tissues. NMFS will notify you if a UME occurs; and if testing is required, you will be responsible for any cost associated with testing the specimens you wish to acquire and use.
- 7) Marine mammal species distribution, stranding trends or other areas of concern (e.g., disease outbreak, locations of entangled whales, etc.) may initiate additional conditions placed on this authorization by the Regional Administrator.
- 8) At the request of NMFS, you must allow an employee of NOAA or any other person designated by the SERO Regional Administrator to observe shark research operations that use marine mammal parts.

- 9) Any footage of shark research involving the use of marine mammal parts must be made available to the NMFS Southeast Regional Office (Erin Fougères; [erin.fougeres@noaa.gov](mailto:erin.fougeres@noaa.gov)) for approval prior to allowing public access of the footage.
- 10) You must comply with any other federal, state, or local laws and regulations pertaining to your research activities.

This authorization expires in **October 2018** and is valid for the following research trips:

- February 2017 – South Carolina
- August 2017 – Long Island, NY
- September 2017 – TBD
- Feb 2018 – North Carolina
- May 2018 – Boca Grande, FL
- September 2018 – Nantucket, MA

This authorization is not valid for work in any other ocean basin aside from the U.S. Atlantic and Gulf of Mexico. Upon expiration, in order to use the existing parts or to obtain additional marine mammal parts for research, please contact Erin Fougères. This authorization includes a novel use of marine mammal parts, and policies and procedures for authorizations of this type are in development; therefore, issuance of this authorization does not guarantee or imply that NMFS will issue or approve subsequent authorizations for the same or similar activities requested, including those of a continuing nature. Noncompliance with the terms of this authorization constitutes a violation and is grounds for modification, suspension, revocation, or enforcement action.

This parts authorization letter does not guarantee receipt of requested samples. You may contact any member of the Southeast Region and Greater Atlantic Marine Mammal Stranding Network to arrange for collection, preservation, and transfer of specimens (see the enclosed list of Stranding Network participants in the Southeast Region and list of Regional Coordinators to contact for Stranding Network participants in other Regions). Transfer of parts must be coordinated with the Stranding Network organization to ensure that no sample is taken prematurely and to ensure accurate disposition of the parts. Although payment is not allowed for marine mammal parts, the Stranding Network organization may assess processing and/or shipping fees.

Your acceptance of these marine mammal specimens absolves NMFS and the Stranding Network of liability for any human health or safety risks, known or unknown, from exposure to these parts.

You are required to provide a written annual report of all specimens received to Erin Fougères, NMFS Southeast Region Stranding Program Administrator (contact information attached). The report must include:

- Species
- Tissue type



- Field identification number of the animal from which the specimen was collected
- Animal's original stranding date
- Date you received the specimen
- Organization/individual from which you received the specimen
- Final disposition of the specimen (destroyed vs. archived)

The report is due by **February 1, 2018**, and every year thereafter until the expiration of this authorization.

The NMFS Southeast Region requires that you acknowledge the cooperating Stranding Network participants and NMFS in any publications or other reports resulting from the use of the transferred material or data. Please send copies of these reports to the NMFS Southeast Regional Office for our files and for distribution to the Stranding Network. Reports and questions regarding this authorization should be directed to Erin Fougères at (727) 824-5323 or [erin.fougeres@noaa.gov](mailto:erin.fougeres@noaa.gov).

Sincerely,

For



Roy E. Crabtree, Ph.D.  
Regional Administrator

Enclosures

50 CFR 216.22 and 216.37

List of Stranding Network participants in the Southeast Region

List of Regional Coordinators

cc: F/PR2 – T. Rowles, S. Wilkin  
F/SEC3 – B. Mase-Guthrie  
F/NER3 – M. Garron  
File: 1514-08b.

**50 CFR § 216.22**

**Taking by State or Local Government Officials, including Stranding Agreement holders**

(a) A State or local government official or employee may take a marine mammal in the normal course of his duties as an official or employee, and no permit shall be required, if such taking:

(1) Is accomplished in a humane manner;

(2) Is for the protection or welfare of such mammal or for the protection of the public health or welfare; and

(3) Includes steps designed to insure return of such mammal, if not killed in the course of such taking, to its natural habitat. In addition, any such official or employee may, incidental to such taking, possess and transport, but not sell or offer for sale, such animal and use any port, harbor, or other place under the jurisdiction of the United States. All steps reasonably practicable under the circumstances shall be taken by any such employee or official to prevent injury or death to the marine mammal as the result of such taking. Where the marine mammal in question is injured or sick, it shall be permissible to place it in temporary captivity until such time as it is able to be returned to its natural habitat. It shall be permissible to dispose of a carcass of a marine mammal taken in accordance with this subsection whether the animal is dead at the time of taking or dies subsequent thereto.

(b) Each taking permitted under this section shall be included in a written report to be submitted to the Secretary every six months beginning December 31, 1973. Unless otherwise permitted by the Secretary, the report shall contain a description of:

(1) The animal involved;

(2) The circumstances requiring the taking;

(3) The method of taking;

(4) The name and official position of the State official or employee involved;

(5) The disposition of the animal, including in cases where the animal has been retained in captivity, a description of the place and means of confinement and the measures taken for its maintenance and care; and

(6) Such other information as the Secretary may require.

(c) Salvage of dead stranded marine mammals or parts therefrom and subsequent transfer.

(1) **Salvage.** In the performance of official duties, a state or local government employee; an employee of the National Marine Fisheries Service, the U.S. Fish and Wildlife Service, or any other Federal agency with jurisdiction and conservation responsibilities in marine shoreline areas; or a person authorized under 16 U.S.C. 1382(c) may take and salvage a marine mammal specimen if it is stranded and dead or it was stranded or rescued and died during treatment, transport, captivity or other rehabilitation subsequent to that stranding or distress if salvage is for the purpose of utilization in scientific research or for the purpose of maintenance in a properly curated, professionally accredited scientific collection.

(2) **Registration.** A person salvaging a dead marine mammal specimen under this section must register the salvage of the specimen with the appropriate Regional Office of the National Marine Fisheries Service within 30 days after the taking or death occurs. The registration must include:

(i) The name, address, and any official position of the individual engaged in the taking and salvage;

(ii) A description of the marine mammal specimen salvaged including the scientific and common names of the species;

(iii) A description of the parts salvaged;

(iv) The date and the location of the taking;

(v) Such other information as deemed necessary by the Assistant Administrator.

(3) **Identification and curation.** The Regional Director will assign a single unique number to each carcass, and the parts thereof, that are salvaged under the provisions of this section. The person who salvaged the specimen may designate the number to be assigned. After this number is assigned, the person who salvaged the specimen must permanently mark that number on each separate hard part of that specimen and must affix that number with tags or labels to each soft part of that specimen or the containers in which that soft part is kept. Each specimen salvaged under this section must be curated in accordance with professional standards.

(4) **No sale or commercial trade.** No person may sell or trade for commercial purposes any marine mammal specimen salvaged under this section.

(5) **Transfer without prior authorization.** A person who salvages a marine mammal specimen under this section may transfer that specimen to another person if:

(i) The person transferring the marine mammal specimen does not receive remuneration for the specimen;

(ii) The person receiving the marine mammal specimen is an employee of the National Marine Fisheries Service, the U.S. Fish and Wildlife Service, or any other Federal agency with jurisdiction and conservation responsibilities in marine shoreline areas; is a person authorized under 16 U.S.C. 1382(c); or is a person who has received prior authorization under paragraph (c)(6) of this section;

(iii) The marine mammal specimen is transferred for the purpose of scientific research, for the purpose of maintenance in a properly curated, professionally accredited scientific collection, or for educational purposes;

(iv) The unique number assigned by the National Marine Fisheries Service is on, marked on, or affixed to the marine mammal specimen or container; and

(v) Except as provided under paragraph (c)(8) of this section, the person transferring the marine mammal specimen notifies the appropriate Regional Office of the National Marine Fisheries Service of the transfer, including notification of the number of the specimen transferred and the person to whom the specimen was transferred, within 30 days after the transfer occurs.

(6) Other transfers within the United States. Except as provided under paragraphs (c)(5) and (c)(8) of this section, a person who salvages a marine mammal specimen, or who has received a marine mammal specimen under the provisions of this section, may not transfer that specimen to another person within the United States unless the Regional Director of the appropriate Regional Office of the National Marine Fisheries Service grants prior written authorization for the transfer. The Regional Director may grant authorization for the transfer if there is evidence that the conditions listed under paragraphs (c)(5)(i), (c)(5)(iii), and (c)(5)(iv) of this section are met.

(7) Transfers outside of the United States. A person who salvages a marine mammal specimen, or a person who has received a marine mammal specimen under the provisions of this section, may not transfer that specimen to a person outside of the United States unless the Assistant Administrator grants prior written authorization for the transfer. The Assistant Administrator may grant authorization for the transfer if there is evidence that the conditions listed under paragraphs (c)(5)(i), (c)(5)(iii), and (c)(5)(iv) of this section are met.

(8) Exceptions to requirements for notification or prior authorization. A person may transfer a marine mammal specimen salvaged under this section without the notification required in paragraph (c)(5)(v) of this section or the prior authorization required in paragraph (c)(6) of this section if:

(i) The transfer is a temporary transfer to a laboratory or research facility within the United States so that analyses can be performed for the person salvaging the specimen; or

(ii) The transfer is a loan of not more than 1 year to another professionally accredited scientific collection within the United States.

[39 FR 1852, Jan. 15, 1974, as amended at 56 FR 41307, Aug. 20, 1991]

No information has been removed or severed from this page

**50 CFR § 216.37 Marine mammal parts.**

With respect to marine mammal parts acquired by take or import authorized under a permit issued under this subpart:

(a) Marine mammal parts are transferrable if:

(1) The person transferring the part receives no remuneration of any kind for the marine mammal part;

(2) The person receiving the marine mammal part is:

(i) An employee of NMFS, the U.S. Fish and Wildlife Service, or any other governmental agency with conservation and management responsibilities, who receives the part in the course of their official duties;

(ii) A holder of a special exception permit which authorizes the take, import, or other activity involving the possession of a marine mammal part of the same species as the subject part; or

(iii) In the case of marine mammal parts from a species that is not depleted, endangered or threatened, a person who is authorized under section 112(c) of the MMPA and subpart C of this part to take or import marine mammals or marine mammal parts;

(iv) Any other person specifically authorized by the Regional Director, consistent with the requirements of paragraphs (a)(1) and (a)(3) through (6) of this section.

(3) The marine mammal part is transferred for the purpose of scientific research, maintenance in a properly curated, professionally accredited scientific collection, or education, provided that, for transfers for educational purposes, the recipient is a museum, educational institution or equivalent that will ensure that the part is available to the public as part of an educational program;

(4) A unique number assigned by the permit holder is marked on or affixed to the marine mammal part or container;

(5) The person receiving the marine mammal part agrees that, as a condition of receipt, subsequent transfers may only occur subject to the provisions of paragraph (a) of this section; and

(6) Within 30 days after the transfer, the person transferring the marine mammal part notifies the Regional Director of the transfer, including a description of the part, the person to whom the part was transferred, the purpose of the transfer, certification that the recipient has agreed to comply with the requirements of paragraph (a) of this section for subsequent transfers, and, if applicable, the recipient's permit number.

(b) Marine mammal parts may be loaned to another person for a purpose described in paragraph

(a)(3) of this section and without the agreement and notification required under paragraphs (a)(5) and (6) of this section, if:

(1) A record of the loan is maintained; and

(2) The loan is for not more than one year. Loans for a period greater than 12 months, including loan extensions or renewals, require notification of the Regional Director under paragraph (a)(6).

(c) Unless other disposition is specified in the permit, a holder of a special exception permit may retain marine mammal parts not destroyed or otherwise disposed of during or after a scientific research or enhancement activity, if such marine mammal parts are:

(1) Maintained as part of a properly curated, professionally accredited collection; or

(2) Made available for purposes of scientific research or enhancement at the request of the Office Director.

(d) Marine mammal parts may be exported and subsequently reimported by a permit holder or subsequent authorized recipient, for the purpose of scientific research, maintenance in a properly curated, professionally accredited scientific collection, or education, provided that:

(1) The permit holder or other person receives no remuneration for the marine mammal part;

(2) A unique number assigned by the permit holder is marked on or affixed to the marine mammal specimen or container;

(3) The marine mammal part is exported or reimported in compliance with all applicable domestic and foreign laws;

(4) If exported or reimported for educational purposes, the recipient is a museum, educational institution, or equivalent that will ensure that the part is available to the public as part of an educational program; and

(5) Special reports are submitted within 30 days after both export and reimport as required by the Office Director under § 216.38.

[61 FR 21937, May 10, 1996]

## Cleveland, Charlene

---

**From:** Cleveland, Charlene  
**Sent:** 2018-May-18 10:34 AM  
**To:** Licence Maritimes / Permis Maritimes (DFO/MPO); Vézina, Alain; Herbert, Glen; Pye, Brad; MacDonald, Carl  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Sorry, response would greatly be appreciated prior to May 26<sup>th</sup>, 2018.

Charlene

---

**From:** Licence Maritimes / Permis Maritimes (DFO/MPO)  
**Sent:** 2018-May-18 10:24 AM  
**To:** Vézina, Alain; Herbert, Glen; Pye, Brad; MacDonald, Carl  
**Cc:** Daley, Annette  
**Subject:** FW: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)  
**Importance:** High

Good morning – the response time has been changed to June 1<sup>st</sup> instead of the original August 1<sup>st</sup> request.

Please review and provide comments/approval for the attached Foreign Vessel Cruise for Scientific Research (Shark species including White Shark).

I have asked NCR to have the applicant provide us with a Map of the Area to be studied, as the areas are only recorded under section 3 of the application. Placentia Bay, Nfld is listed, but as we do not licence vessels for other waters, I will notify Nfld licensing that this application will be reviewed and no doubt, approved for our waters. If Nfld requests that Placentia Bay be included, we will do that.

Thanks and have a nice day!

Charlene Cleveland  
Regional Officer, Licensing Services  
Dept of Fisheries & Oceans  
Dartmouth, Nova Scotia  
Tel: (902) 426-9966  
Fax: (902) 426-5010  
[Licence.maritimes.permis@dfo-mpo.gc.ca](mailto:Licence.maritimes.permis@dfo-mpo.gc.ca)

---

**From:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO)  
**Sent:** 2017-November-30 1:14 PM  
**To:** Licence Maritimes / Permis Maritimes (DFO/MPO); Duggan, Charmaine; Kean, Jackie; Bowdring, Tony  
**Cc:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO); Lavigne, Élise; Farr, Connie; Chmiel, Jim; [HlxEcareq1@innav.gc.ca](mailto:HlxEcareq1@innav.gc.ca)  
**Subject:** IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Good afternoon,



Please see attached US Marine Scientific Research (MSR) request for the **OCEARCH, Sep 1 – Oct 31, 2018**. It appears as though the proponent intends to conduct work in both Newfoundland and Maritimes Regions (though primarily in Maritimes).

The vessel intends to call on Halifax, NS, between **Sep 9 – Oct 31, 2018**, for provisioning.

We kindly request all responses by **August 1, 2018**.

Best wishes,

Andrew

## **Cleveland, Charlene**

---

**From:** Cleveland, Charlene  
**Sent:** 2018-May-18 10:01 AM  
**To:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO); Duggan, Charmaine; Kean, Jackie; Bowdring, Tony  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Good morning – can you please request a Map be provided from the application, of the areas that this vessel intends to travel during this research cruise.

Response time has been changed to **June 1<sup>st</sup>** so in order to avoid a delay in the response, please provide asap.

Regards,

Charlene Cleveland  
Regional Officer, Licensing Services  
Dept of Fisheries & Oceans  
Dartmouth, Nova Scotia  
Tel: (902) 426-9966  
Fax: (902) 426-5010  
[Licence.maritimes.permis@dfo-mpo.gc.ca](mailto:Licence.maritimes.permis@dfo-mpo.gc.ca)

---

**From:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO)  
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**Cc:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO); Lavigne, Élise; Farr, Connie; Chmiel, Jim; [HlxEcareg1@innav.gc.ca](mailto:HlxEcareg1@innav.gc.ca)  
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Please see attached US Marine Scientific Research (MSR) request for the **OCEARCH, Sep 1 – Oct 31, 2018**. It appears as though the proponent intends to conduct work in both Newfoundland and Maritimes Regions (though primarily in Maritimes).

The vessel intends to call on Halifax, NS, between **Sep 9 – Oct 31, 2018**, for provisioning.

We kindly request all responses by **August 1, 2018**.

Best wishes,

Andrew

## **Cleveland, Charlene**

---

**From:** Herbert, Glen  
**Sent:** 2018-May-22 3:39 PM  
**To:** Licence Maritimes / Permis Maritimes (DFO/MPO); Vézina, Alain; Pye, Brad; MacDonald, Carl  
**Cc:** Daley, Annette  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

**Follow Up Flag:** Follow up  
**Flag Status:** Completed

**Categories:** RHQ

EM approves, but please use the latest whale conditions in the form.

### **Whales**

R/V to report sightings of North Atlantic right whales (same day if possible) to DFO Maritimes Region. Contact: 1-844-800-8568; [XMARWhalesightings@dfo-mpo.gc.ca](mailto:XMARWhalesightings@dfo-mpo.gc.ca). All whale records (post voyage), including location, date and photos, to be submitted to DFO Maritimes Region.

R/V to adhere to guidance contained in Canadian Coast Guard Annual Notice to Mariners: A2 - 5. GENERAL GUIDELINES FOR AQUATIC SPECIES AT RISK AND IMPORTANT MARINE MAMMAL AREAS: Grand Manan Basin Critical Habitat and Roseway Basin Critical Habitat/Area To Be Avoided. See: <https://www.notmar.gc.ca/publications/annual-annuel/section-a/a5-en.php>

R/V to report any collisions with whales, entangled whales or dead whales to the whale emergency hotline (1-866-567-6277), VHF Channel 16, or Fundy Traffic VHF Channel 14.

---

Glen Herbert  
Regional Manager  
Oceans and Coastal Management Division  
Ecosystem Management Branch  
Fisheries and Oceans Canada – Maritimes Region  
Bedford Institute of Oceanography  
1 Challenger Dr., PO Box 1006  
5th Floor, Polaris Bldg.  
Dartmouth, NS, B2Y 4A2  
Tel: (902) 802 7051  
Email: [glen.herbert@dfo-mpo.gc.ca](mailto:glen.herbert@dfo-mpo.gc.ca)

---

**From:** Licence Maritimes / Permis Maritimes (DFO/MPO)  
**Sent:** May-18-18 10:24 AM  
**To:** Vézina, Alain; Herbert, Glen; Pye, Brad; MacDonald, Carl  
**Cc:** Daley, Annette  
**Subject:** FW: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)  
**Importance:** High

Good morning – the response time has been changed to **June 1<sup>st</sup>** instead of the original August 1<sup>st</sup> request.

Please review and provide comments/approval for the attached Foreign Vessel Cruise for Scientific Research (Shark species including White Shark).

I have asked NCR to have the applicant provide us with a Map of the Area to be studied, as the areas are only recorded under section 3 of the application. Placentia Bay, Nfld is listed, but as we do not licence vessels for other waters, I will notify Nfld licensing that this application will be reviewed and no doubt, approved for our waters. If Nfld requests that Placentia Bay be included, we will do that.

Thanks and have a nice day!

Charlene Cleveland  
Regional Officer, Licensing Services  
Dept of Fisheries & Oceans  
Dartmouth, Nova Scotia  
Tel: (902) 426-9966  
Fax: (902) 426-5010  
[Licence.maritimes.permis@dfo-mpo.gc.ca](mailto:Licence.maritimes.permis@dfo-mpo.gc.ca)

---

**From:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO)

**Sent:** 2017–November-30 1:14 PM

**To:** Licence Maritimes / Permis Maritimes (DFO/MPO); Duggan, Charmaine; Kean, Jackie; Bowdring, Tony

**Cc:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO); Lavigne, Élise; Farr, Connie; Chmiel, Jim;

[HlxEcareg1@innav.gc.ca](mailto:HlxEcareg1@innav.gc.ca)

**Subject:** IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Good afternoon,

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The vessel intends to call on Halifax, NS, between **Sep 9 – Oct 31, 2018**, for provisioning.

We kindly request all responses by **August 1, 2018**.

Best wishes,

Andrew

## MacDonald, Jennifer

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**From:** MacDonald, Jennifer  
**Sent:** May-22-18 12:06 PM  
**To:** Herbert, Glen  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

**Categories:** To file

Hi Glen,  
We have issued a SARA permit to OCEARCH for the shark tagging. Thanks for checking.  
Jenn

**Jennifer MacDonald**  
Species at Risk Management Division  
(902) 407-8175

---

**From:** Herbert, Glen  
**Sent:** May-21-18 9:17 AM  
**To:** MacDonald, Jennifer  
**Subject:** FW: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)  
**Importance:** High

Hi Jennifer,

*I am not sure if a SARA permit is in place or needed for this shark research.*

We have to respond to RM by June 1.

Thanks,  
Glen

---

Glen Herbert  
Regional Manager  
Oceans and Coastal Management Division  
Ecosystem Management Branch  
Fisheries and Oceans Canada – Maritimes Region  
Bedford Institute of Oceanography  
1 Challenger Dr., PO Box 1006  
5th Floor, Polaris Bldg.  
Dartmouth, NS, B2Y 4A2  
Tel: (902) 802 7051  
Email: [glen.herbert@dfo-mpo.gc.ca](mailto:glen.herbert@dfo-mpo.gc.ca)

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**Sent:** May-18-18 10:24 AM  
**To:** Vézina, Alain; Herbert, Glen; Pye, Brad; MacDonald, Carl  
**Cc:** Daley, Annette  
**Subject:** FW: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)  
**Importance:** High

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**To:** Licence Maritimes / Permis Maritimes (DFO/MPO); Duggan, Charmaine; Kean, Jackie; Bowdring, Tony  
**Cc:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO); Lavigne, Élise; Farr, Connie; Chmiel, Jim; HlxEcareg1@innav.gc.ca  
**Subject:** IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

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Best wishes,

Andrew

## MacDonald, Jennifer

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**From:** Spence, Koren R  
**Sent:** May-22-18 3:55 PM  
**To:** MacDonald, Jennifer  
**Cc:** Gromack, Aimee  
**Subject:** FW: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)  
**Attachments:** IGR-351 US MSR Request OCEARCH (Sep 1 - Oct 31 2018).pdf; Oearch - September 1 to October 31, 2018 (Initial).doc

**Importance:** High

**Categories:** To file

Just wanted to make sure you guys got this for s73 review...since they are fishing for sharks I presume there are White shark implications.

---

**From:** MacDonald, Carl  
**Sent:** May-22-18 3:52 PM  
**To:** Doherty, Penny; Goshulak, Larissa; Hayman, Timothy; Quigley, Sara; Reeves, Alan; Saunders, Jennifer; Soomai, Suzuette; Spence, Koren R; Stevens, Greg; Sweet, Marilyn; Macdonald, Claire; Fraser, Matthew J  
**Cc:** Waters, Christa  
**Subject:** FW: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)  
**Importance:** High

Hi All,

Any concerns with this research from your fisheries standpoint. If so, Please advise me by May 25.

Regards,

Carl MacDonald  
Resource Management  
Fisheries & Oceans Canada | Government of Canada  
[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca) | Tel: 902-293-8257 | Fax: 902-426-7967

Regional agent principal de gestion des peches, Gestion des ressources  
Pêches et Océans Canada | Gouvernement du Canada  
[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca) | Tél: 902-293-8257 | Télécopieur: 902-426-7967

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**Cc:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO); Lavigne, Élise; Farr, Connie; Chmiel, Jim; HlxEcareg1@innav.gc.ca  
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Best wishes,

Andrew



## APPLICATION FOR CONSENT TO CONDUCT MARINE SCIENTIFIC RESEARCH

### 1. General Information

1.1 Cruise name and/or number:		Expedition Nova Scotia - F2017-120
1.2 Sponsoring institution(s):		
Name	Address	Name of Director
OCEARCH	1790 BONANZA DR. SUITE 101 PARK CITY, UT 84060 UNITED STATES +1 435-645-8990 CHRIS@OCEARCH.ORG	CHRIS FISCHER
1.3 Scientist in charge of the project:		
Name:	Robert Hueter	
Country:	US	
Affiliation:	More Marine Laboratory	
Address:	1600 Ken Thompson Parkway Sarasota, Florida 34236 US	
Telephone:	941-388-4441	
Email:	rhueter@mote.org	
1.4 Entity(ies) /Participant(s) from coastal State involved in the planning of the project: See Section 8		
Name:	Name: Chris Fischer	
Country:	Affiliation: OCEARCH	
Affiliation:	Address: 1790 Bonanza Drive	
Address:	Phone: 435-645-8990	
Telephone:	Fax: 000-000-0000	
Fax:	Email: chris@oearch.org	
Email:		
Website (for CV and photo):		

### 2. Description of Project

2.1 Nature and objectives of the project:	
TO COLLECT CRITICAL SCIENTIFIC DATA RELATED TO TELEMETRY AND BIOLOGICAL STUDIES OF KEYSTONE MARINE SHARK SPECIES. TO CAPTURE SHARKS, TAG, COLLECT BIOLOGICAL DATA AND RELEASE THE ANIMALS BACK INTO THEIR NATURAL HABITAT. TO ENGAGE THE LOCAL COMMUNITIES WHERE THE EXPEDITION IS CENTERED AROUND THROUGH PRESENTATIONS, EVENTS, AND SHIP TOURS TO BRING THEM INTO THE GLOBAL CONVERSATION ABOUT SHARK AWARENESS AND CONSERVATION.	
2.2 Relevant previous or future research projects:	
SEE ATTACHED BRIEF	
2.3 Previous publications relating to the project:	
<p>OCEARCH. 2017. Global Shark Tracker. <a href="http://www.oearch.org">http://www.oearch.org</a>. Block, B. A. et al. 2011. Tracking apex marine predator movements in a dynamic ocean. <i>Nature</i> 475, 86-90, doi:10.1038/nature10082. Bonfil R, Meyer M, Scholl MC, Johnson R and others. 2005. Transoceanic migration, spatial dynamics, and population linkages of white sharks. <i>Science</i> 310: 100-103. Boustany AM, Davis SF, Pyle P, Anderson SD, Le Boeuf BJ, Block BA. 2002. Expanded niche for white sharks. <i>Nature</i> 415: 35-36. Casey JG, Pratt HL (1985) Distribution of the white shark, <i>Carcharodon carcharias</i>, in the western North Atlantic. <i>Mem South Calif Acad Sci</i> 9: 2-14. Curtis TH et al. 2014. Seasonal distribution and historic trends in abundance of white sharks, <i>Carcharodon carcharias</i>, in the western North Atlantic ocean. <i>PLOS ONE</i> 9: e99240. Domeier ML. 2012. A new life history hypothesis for white sharks, <i>Carcharodon carcharias</i>, in the Northeastern Pacific. In: Domeier ML (ed) <i>Global perspectives on the biology and life history of the white shark</i>. CRC Press, Boca Raton, FL, p 199-224. Domeier ML, Nasby-Lucas N. 2008. Migration patterns of white sharks <i>Carcharodon carcharias</i> tagged at Guadalupe Island, Mexico, and identification of an eastern Pacific shared offshore foraging area. <i>Mar Ecol Prog Ser</i> 370: 221-237. Domeier ML, Nasby-Lucas N. 2012. Sex-specific migration patterns and sexual segregation of adult white sharks, <i>Carcharodon carcharias</i>, in the Northeastern Pacific. In: Domeier ML (ed) <i>Global perspectives on the biology and life history of the white shark</i>. CRC Press, Boca Raton, FL, p 133-146. Domeier ML, Nasby-Lucas N. 2013. Two-year migration of adult female white sharks (<i>Carcharodon carcharias</i>) reveals widely separated nursery areas and conservation concerns. <i>Anim Biotelem</i> 1: 2, doi:10.1186/2050-3385-1-2. Queiroz, N. et al. 201. Ocean-wide tracking of pelagic sharks reveals extent of overlap with longline fishing hotspots. <i>Proceedings of the National Academy of Sciences</i> 113, 1582-1587. Skomal, G., Braun, C., Chisholm, J. &amp; Thorrold, S. 2017. Movements of the white shark <i>Carcharodon carcharias</i> in the North Atlantic Ocean. <i>Marine Ecology Progress Series</i> 580, 1-16.</p>	

### 3. Geographical Areas

3.1 Indicate geographical areas in which the project is to be conducted (with reference in latitude and longitude, including coordinates of cruise track/ way points):

MAHONE BAY, NOVA SCOTIA 44-29.50 N 64-13.50 W BAY OF FUNDY, NOVA SCOTIA 44-54.00 N 66-32.50 W  
PLACENTIA BAY, NEWFOUNDLAND 47-05.00 N 54-32.00 W SABLE ISLAND, NOVA SCOTIA 43-56.14 N 59-56.59 W

3.2 Attach chart(s) at an appropriate scale (1 page, high-resolution) showing the geographical areas of the intended work and, as far as practicable, the location and depth of sampling stations, the tracks of survey lines, and the locations of installations and equipment.

Chart provided - see Section 10.1.

### 4. Methods and Means to be Used

#### 4.1 Particulars of vessel:

Name:	OCEARCH
Type/Class:	Ship
Nationality (Flag state):	United States
Identification Number (IMO/Lloyds No.):	967106
Owner:	George Christopher Fischer
Operator:	Team Fisch
Overall length (meters):	38.00
Maximum draught (meters):	4.00
Displacement/Gross tonnage:	191.00
Propulsion:	Mechanical - diesel
Cruising:	8.00
Maximum speed:	10.00
Call sign:	WDC 7577
INMARSAT number and method and capability of communication (including emergency frequencies):	011-8816-4146-8538
Name of master:	Capt. Brett McBride & Capt. David Stevenson
Number of crew:	15
Number of scientists on board:	10

#### 4.2 Other craft in the project, including its use:

Contender and SAFE boat

#### 4.3 Particulars of methods and scientific instruments:

Types of samples and measurements	Methods to be used	Instruments to be used
MUSCLE, BLOOD, FIN CLIP, PARASITE AND SLIME COAT SAMPLES WILL BE COLLECTED. MORPHOMETRIC, ACOUSTIC, PSAT, AND SATELLITE TAG DATA WILL BE ADDED.	The main method of capture is a single hook and line (handline) deployed by the OCEARCH crew. This method is extremely effective; by attracting the shark with the bait on the surface, they are able to select the size of the animal to catch, and thereby avoid catching animals not needed for the study. Sharks are caught from a tender using a handline with a baited circle hook (size of hook appropriate for the species and size targeted). Once the shark is hooked, buoys are attached to the line to keep the shark near the surface. The shark is then guided onto the submerged platform of the mother ship. Once the shark is on the platform, the platform is raised and the shark is put in position for tagging/sampling procedures. On the platform a damp cloth is used to cover the sharks eyes and reduce stress, two high volume, low pressure hoses with continuous flow of seawater are used to keep the gills wet and the shark is restrained by the head and with a tail hook. All procedures on the platform take	HOOK AND LINE; MOUSETRAP DRUM RIG; SPECIALLY DESIGNED LIFT SYSTEM; CHASE BOATS

	on average 10-12 minutes and the shark is released. The procedures follow a strict time period i.e. if all the samples and tagging are not completed within 15 minutes, the animal is released (this rarely happens as most of the time the work is finished well within the 15 minutes). The tagging, handling and sampling procedures employed during the expedition follow the standards ethics committee of each institution involved in the work. Occasionally, scientifically designed drumlines are used to catch sharks. The drumlines have buoys placed next to the hook in a way that it doesn't allow the shark to swallow the hook and guarantees hooking at the side of the mouth. The drumlines are set in a radius of 1-2 km from the main vessel and are constantly monitored with the shark staying hooked in the drumline for a minimum amount of time (5-7 minutes)	
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4.4 Indicate nature and quantity of substances to be released into the marine environment:

No

4.5 Indicate whether drilling will be carried out. If yes, please specify:

No

4.6 Indicate whether explosives will be used. If yes, please specify type and trade name, chemical content, depth of trade class and stowage, size, depth of detonation, frequency of detonation, and position in latitude and longitude:

No

4.7 Indicate whether protected species be studied. If yes, please specify:

yes

WHITE SHARK (Carcharodon carcharias)

## 5. Installations and Equipment

Details of installations and equipment (including dates of laying, servicing, method and anticipated timeframe for recovery, locations and depth, and measurements):

No

## 6. Dates

6.1 Expected dates of first entry into and final departure from the research area by the research vessel and/or other platforms:

Project Start Date: Sep 01, 2018

Project End Date: Oct 31, 2018

6.2 Coastal State-specific details:

Coastal Area	Estimated Entry Date	Estimated Departure Date
Canada	Sep 01, 2018	Oct 31, 2018

Explanation of multiple entries:

N/A

Research will be performed: within 12 nm

Extent to which Canada will be enabled to participate or to be represented in the research project:

FULL PARTICIPATION BY THE COASTAL STATE

Name, affiliation and contact information for all participants from Canada:

## 7. Port Calls

Port	Arrival Date	End Date	Special Logistical	Shipping Agent
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			Requirements	
Halifax	9/1/2018	10/31/2018	PROVISIONS	NONE AT THIS TIME

8. Participation of the representative of the coastal State

8.1 Modalities of the participation of the representative of the coastal State in the research project:
See Section 6.2.

8.2 Proposed dates and ports for embarkation/disembarkation:
See Section 6.2.

9. Access to Data, Samples and Research Results

9.1 Expected dates of submission to coastal State of preliminary report, which should include the expected dates of submission of the data and research results:
No more than 60 days from the end date of the research as provided in Section 6.1.

9.2 Anticipated dates of submission to the coastal State of the final report:
No more than 2 years from the end date of the research as provided in Section 6.1.

9.3 Proposed means for access by coastal State to data (including format) and samples:
Data will be provided through official channels at no cost to the coastal State(s). Samples will be provided upon request.

9.4 Proposed means to provide coastal State with assessment of data, samples and research results:
Assessment of data, samples and research results will be provided at no cost to the coastal State(s).

9.5 Proposed means to provide assistance in assessment or interpretation of data, samples and research results:
Assistance in further assessment or interpretation will be provided upon request.

9.6 Proposed means of making results internationally available:
ALL DATA WILL BE KEPT ON A GENERAL SERVER THAT ANYONE CAN ACCESS AT ANY TIME. THE CURRENT POLICY WITHIN THE ORGANIZATION IS TO SHARE AND MAKE DATA AVAILABLE TO ANYONE, ANYWHERE IN THE WORLD.

10. List of Supporting Documentation

10.1 List of attachments, such as additional forms required by the coastal State, etc.:			
Attachment Type	Description	Attachment	Submission Date
Supplemental Material	DESCRIPTION OF CURRENT RESEARCH PROJECTS BEING CONDUCTED ON THE NORTH ATLANTIC WHITE SHARK	0845781250_NA white shark brief.docx	Oct 18, 2017
Supplemental Material	DESCRIPTION OF CAPTURE AND SAMPLING METHODOLOGY	1404062500_OCEARCH_methodology_permitapplication.docx	Oct 18, 2017
Proposed Cruise Track	ARRIVAL AND DEPARTURE PLANS FOR THIS RESEARCH CRUISE	8111875000_OCEARCH Proposed Cruise Track Canda 2018.doc	Nov 13, 2017

**PROPOSED CRUISE TRACK**  
**NOVA SCOTIA AND NEWFOUNDLAND, CANADA 2018**

Wednesday, August 29<sup>th</sup>, 2018

DEPART – New Bedford, Massachusetts, USA

Saturday, September 1<sup>st</sup>, 2018

ARRIVE – Halifax, Nova Scotia, CANADA

Wednesday, September 12<sup>th</sup>, 2018

DEPART – Halifax, Nova Scotia, CANADA

Thursday, September 13<sup>th</sup> – October 10<sup>th</sup>, 2018

RESEARCH – Mahone Bay, Nova Scotia; Bay of Fundy, Nova Scotia; Sable Island, Nova Scotia; Placentia Bay, Newfoundland

Thursday, October 11<sup>th</sup>, 2018

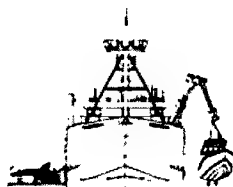
ARRIVE – Halifax, Nova Scotia, CANADA

Wednesday, October 31<sup>st</sup>, 2018

DEPART – Halifax, Nova Scotia, CANADA

Saturday, November 3<sup>rd</sup>, 2018

ARRIVE – Nantucket, Massachusetts, USA



## **North Atlantic White Shark Research**

### **Principal Investigators**

██████████ – South Carolina Department of Natural Resources  
R. Hueter - Center for Shark Research, Mote Marine Laboratory

### **I. Movements of white sharks in the Atlantic Ocean**

**R. Hueter, ██████████ – Center for Shark Research, Mote Marine Laboratory**  
██████████ – Woods Hole Oceanographic Institution

The objective of the proposed study is to examine fine- and broad-scale movements, habitat use, site fidelity, residency, and feeding behavior of white sharks in southern New England and along the east coast of the US using multiple technologies including passive acoustic telemetry and satellite-based tagging. During 2016, we propose to tag up to 20 white sharks off the coast of Florida and Georgia with individually-coded acoustic transmitters, as well as pop-up satellite (PSAT) and real-time satellite (SPOT) tags. Shark movements and behavior will be passively tracked using acoustic receiver arrays. Movements will be correlated with those of prey species, which include gray seals and North Atlantic right whales.

### **II. The physiological effects of capture stress in the white shark**

██████████ - University of Massachusetts  
██████████ – Cape Eleuthera Institute  
██████████ – Wildlife Conservation Society

**M. Hyatt – Adventure Aquarium**

Given the importance of white shark post-release survivorship to population growth, a detailed assessment of the physical and physiological effects of capture and their subsequent impacts on survivorship is warranted. The objectives of the current study are to: (1) quantify relative acid-base, electrolyte, and metabolite disturbances in the blood of white sharks exposed to capture, air exposure, and handling; (2) examine immediate and delayed post-release mortality with satellite tracking; and (3) characterize post-release recovery in this species using accelerometry.

### **III. Aspects of reproduction in white sharks**

**J. Gelsleichter - University of North Florida**

Little is known of the reproductive biology of the white shark in the western North Atlantic. We will take advantage of direct access to live animals on the M/V Ocearch to obtain blood for the analysis of reproductive hormones (estradiol and progesterone for females, testosterone for males) using commercially available chemiluminescence immunoassays. In addition, ultrasound technology will be used to assess the reproductive status of females. In males, clasper characteristics will be qualified and quantified. Our objectives are to assess reproductive condition, reproductive cycle, gestation period, and fecundity.

#### **IV. The trophic ecology of white sharks in the western North Atlantic** **– Woods Hole Oceanographic Institution**

Understanding the trophic ecology of white sharks is important because as apex predators, they are likely to have a disproportionate influence on food web structure in coastal oceans. Conventional bulk stable isotope analyses used to determine trophic position (TP) are challenging for highly migratory species, such as white sharks, that move through isotopically distinct food webs and shift diets seasonally and ontogenetically. Recent advances in compound-specific stable isotope analysis (e.g. individual amino acids) have significantly reduced the influence of potentially confounding variables (shifting TP and different isotopic baselines) when determining TP of highly migratory species. Compound-specific stable isotope analyses will be conducted on muscle tissue from sharks sampled on the Oearch to examine temporal shifts in TP, changes in isotopic baseline values, and/or migration between isotopically distinct habitats.

#### **V. Studies of ectoparasites of white sharks** **– Auburn University**

Ectoparasites commonly infect white sharks and are primarily represented by siphonostomes (Siphonostomatoida, Copepoda). Several reports of parasitic copepods from white sharks have indicated that at least on occasions, individual sharks host eight or more species of copepods. One interesting facet of this phenomenon is that in such cases, few of the parasite species are exclusive parasites of white sharks, but that rather they are species which also infect a variety of other elasmobranchs and not necessarily those species with the closest phylogenetic ties to the white shark. In reflecting on this situation, one group of co-authors proposed that the wide ranging travels of large white sharks may provide opportunity for such species rich infections by placing the potential host in a wide variety of different habitats throughout the year where other less migratory sharks and their ectoparasites exist. With the above in mind, the primary purpose of this project is to collect baseline ectoparasite data (parasite species presence, abundance, and infection site) from large white sharks to see if the aforementioned cases represent anomalies or a more general characteristic of white sharks worth further investigation.

#### **VI. A comparative analysis of DNA sequence variation in the white shark within and among ocean basins** **G. Naylor – College of Charleston**

There are now a number of documented cases where pelagic fish species, like white sharks, that routinely migrate thousands of kilometers across the world's oceans show striking genetic sub-structure among populations. Such restricted gene flow in the face of extensive individual movement is generally taken to be an indicator of fidelity to a breeding site. Animals may range far and wide but return to the same site/region to breed. It follows from this that contrasting population genetic data with information from tracking studies can yield insights into breeding behavior and the incidence of philopatry. Our objective is to

determine the global population structure among white sharks to provide a baseline against which tracking data can be interpreted. We will contrast population structure in white sharks deduced from comparative analysis of DNA sequence data with tracking information from the OCEARCH satellite tagging program.

## **VII. Contaminants of emerging concern in white sharks from U.S. Atlantic waters**

### **██████████ – Cape Canaveral Scientific**

Contaminants of emerging concern (CESs) include flame retardants, pharmaceuticals, personal care products, and an array of other anthropogenic pollutants released into aquatic environments that can readily accumulate within biological matrices of fish and other biota on a global scale. The direct effects of CESs on marine biota and the fate of these potentially toxic compounds in marine systems are not well understood. Anthropogenically based CESs can serve as endocrine disruptors that alter normal endocrine system function and subsequently cause adverse effects in aquatic organisms or their progeny. We will analyze a full array of CESs in blood plasma, red blood cells, and available tissue types collected from live white sharks from US waters during OCEARCH research operations. These first efforts will be a significant step forward to better understand current concentrations of CESs in the western North Atlantic white shark population.

## **VIII. Nutritional markers in white sharks sampled in the western North Atlantic**

### **L. Hoopes – Georgia Aquarium**

### **██████████ – Wildlife Conservation Society**

Despite their ecological importance as top predators in marine ecosystems, few studies have monitored nutritional parameters of sharks in the wild. Understanding baseline nutritional parameters in free-ranging sharks has direct application to the management of diets and nutrition of these species managed in zoos and aquaria, where little is known about the nutrient requirements for this group of animals. The goal of this project is to develop reference values for trace minerals, vitamins, and fatty acids for a variety of elasmobranch species in order to identify parameters that may need to be adjusted or supplemented in captive diets. These nutritional parameters may also lend some insight into the nutritional status and health of free-ranging populations when partnered with other sample analyses (e.g., stable isotopes, clinical pathology panels, heavy metals). Plasma samples will be sent to diagnostic laboratories for trace minerals (iron, zinc, copper, selenium, cobalt, manganese, molybdenum), vitamin (A and E), and fatty acid analysis.

## **IX. Antibiotic Producing Bacteria Associated with White Sharks**

### **K. Ritchie - Mote Marine Laboratory**



Studies exploring innate immunity via bacterial associations play an important role in identifying mutualistic interactions between bacteria and host organisms. Due to low infection rates of elasmobranchs, recent studies have focused on the isolation of novel antimicrobials from bacterial associates of stingray and skate species. Objectives of this study are to survey bacteria associated with the epidermal surfaces of white sharks as: (1) a study to address bacterial roles in innate immunity and; (2) a novel source of antibiotics. Bacteria will be cultured, purified and screened against 8 human and 3 marine pathogens for antibiotic potential.

#### **X. Revealing white shark inter- and intra-specific interactions**

**— Florida Atlantic University's Harbor Branch Oceanographic Institute**

The pervasiveness and popularity of acoustic telemetry activity along the US East coast has generated tremendous collaborative opportunities in the last decade. Various state, federal, and academic institutions have pooled their resources to develop coast-wide arrays (e.g., ACT) to track dispersal and movement patterns of a wide variety of fauna. In addition to the common method of deploying acoustic arrays along fixed locations (i.e., gates), researchers have recently begun to experiment with mobile platforms, including autonomous vehicles, to increase acoustic spatial coverage and piece together missing gaps in movement data. To date, there has been little implementation of animal-borne approaches to mobile acoustic tracking, which has the potential to reveal association patterns among telemetered individuals (conspecifics, predators, and prey). Here, we propose the first known deployment of a fishery-independent, multifrequency acoustic mini-receiver. We will take advantage of the smallest receiver available on the market (Sonotronics miniSUR, 12 g in water) that is capable of collecting data from the 1000's of acoustic tags currently active along the Atlantic seaboard. This receiver will be integrated into a small satellite tag float package set to release from the animal after several weeks. The recovered data will have the potential to reveal important interactions among individual white sharks and between white sharks and other species. Further, these data will enable us to look at whether white sharks are still interacting with individuals with defunct satellite tags yet active acoustic tags and continuous association patterns below the surface.

The methods used on the Ocearch platform have been developed over a period of 8 years, including international teams of approximately 50 scientists through that period. Approximately 200 sharks have been tagged from the Ocearch platform, with no detrimental effects on animals observed in the last 3 years (Skomal ref). We plan to deploy: (1) SPOT tags with 5 year lifespan to monitor long term movements and understand the degree of internannual consistency in movements and identify key habitats such as breeding and nursery grounds; (2) internal acoustic tags on the same animals, to generate information on movements for periods up to 10 years with respect to existing ACT and FACT receivers along America's east coast. All animals will have blood and tissue samples taken for fatty acid, stable isotope and genetic analyses.

**Methods:**

1) Shark Fishing/Handling

The main method of capture is a single hook and line (handline) deployed by the OCEARCH crew. This method is extremely effective; by attracting the shark with the bait on the surface, they are able to select the size of the animal to catch, and thereby avoid catching animals not needed for the study. Sharks are caught from a tender using a handline with a baited circle hook (size of hook appropriate for the species and size targeted). Once the shark is hooked, buoys are attached to the line to keep the shark near the surface. The shark is then guided onto the submerged platform of the mother ship. Once the shark is on the platform, the platform is raised and the shark is put in position for tagging/sampling procedures. On the platform a damped cloth is used to cover the sharks eyes and reduce stress, two high volume, low pressure hoses with continuous flow of seawater are used to keep the gills wet and the shark is restrained by the head and with a tail hook. All procedures on the platform take on average 10-12 minutes and the shark is released. The procedures follow a strict time period i.e. if all the samples and tagging are not completed within 15 minutes, the animal is released (this rarely happens as most of the time the work is finished well within the 15 minutes). The tagging, handling and sampling procedures employed during the expedition follow the standards ethics committee of each institution involved in the work. Occasionally, scientifically designed drumlines are used to catch sharks. The drumlines have buoys placed next to the hook in a way that it doesn't allow the shark to swallow the hook and guarantees hooking at the side of the mouth. The drumlines are set in a radius of 1-2 km from the main vessel and are constantly monitored with the shark staying hooked in the drumline for a minimum amount of time (5-7 minutes)

2) Estimation of residency – acoustic tagging

White sharks will be internally tagged with an acoustic transmitter with a life span of 10 years. Immediately after the platform is raised the shark is restrained and held upside down until the sharks are in a natural state of tonic immobility. The incision point will be made on the ventral surface approximately midway between the cloaca and pectoral fins along the centre line of the abdomen. The tag will then be inserted and the wound will be closed with surgical sutures in the muscle and skin (approximately 3 stitches). Data from the sharks tagged with acoustic transmitters will be automatically obtained from receiver stations from the ACT and FACT networks installed throughout the eastern coast of the United States, without requiring further interactions with the tagged sharks. The method proposed to tag sharks has previously been performed in several shark species by several agencies in Australia and internationally (Papastamatiou 2010, Speed et al 2011, Ferreira et al 2013, Heupel et al 2015, among many others). The method has been approved by the University

of Western Australia Animal Ethics Committee (For all procedures described: RA/3/100/1209 - attached).

### 3) Large scale movements – satellite tagging

Once the surgery is performed the shark is turned up for the external tagging. A SPOT tag is mounted on the shark's dorsal fin using screws made of corrodible material that allow the tag to fall off after battery exhaustion (approximately 5 years). This procedure is standard but is also mandatory as the tag's antenna must remain out of the water when the shark is on the surface to transmit data. The tag is also coated with anti-fouling paint. The proposed method has been used in several studies and publications by internationally recognized researchers worldwide (Domeier and Nasby-Lucas 2013, Lowe et al 2014) and in Australia (Bruce et al 2006).

### 4) Quantification of energy costs – 3-D accelerometer package.

After the SPOT tag is fixed to the dorsal fin, a few sharks will also be externally tagged with a 3-D accelerometer. The accelerometer is attached to the dorsal musculature by a stainless steel anchor applied with a specialised pole. The accelerometer will remain on the shark for periods ranging 4 hours to 4 days depending on weather conditions. After the pre-set period, the accelerometer will automatically detach from the shark and float to the surface where it will be recovered. Accelerometer package will be recovered using a combination of satellite positioning and UHF radio transmitters. Similar accelerometer packages have been deployed on various species of sharks in Hawaii and Australia, and on white sharks in South Africa (Mineta et al. 1996; Gleiss et al. 2009; Nakamura et al. 2011). The 3-D accelerometers will also be equipped with small cameras, which will film the behaviour of white sharks throughout the deployment period. The cameras will be deployed and recovered at the same time as the 3-D accelerometer. Camera/accelerometer tags were successfully deployed and recovered on large tiger and hammerhead sharks during the two previous expeditions in Australia.

### 5) Muscle, blood and fin clip sampling

A first blood sample (5 ml) will be taken when the shark first arrives on the platform and a second blood sample is taken just before release (5 ml). Blood will be collected with an 18-gauge needle from the caudal vein. Blood will be placed into collection vials with no additives or interior coating and separated into components (red cells and plasma) using a portable centrifuge. Both blood components will be then frozen and will also be used in isotope and hormonal analyses. The hormonal analysis will allow us not only to identify reproductive stage (if the shark is ready to mate or pregnant – for females) but will also be used to measure stress level. Previous blood studies with white sharks during OCEARCH tagging procedures have shown very low levels of stress (Marshall.Low Stress Level, Stress Skomal and Marshall.Comparison\_Lactate – attached). A fin clip (2 cm<sup>2</sup>) will be taken from the caudal and kept in 95% ethanol for genetic studies. A small sample (3-5g) of white dorsal muscle will be collected using a biopsy punch, about 5 cm lateral to the first dorsal fin. Muscle samples will be frozen to be used for stable isotope and fatty acids analysis.

## **References**

Domeier, M.L., Nasby-Lucas, N. (2013). Two-year migration of adult female white sharks (*Carcharodon carcharias*) reveals widely separated nursery areas and conservation. *Animal Biotelemetry* 1:1-9.

- Ferreira, L.C., Afonso, A.S., Castilho, P.C. & Hazin, F.H.V. (2012). Habitat use of the nurse shark, *Ginglymostoma cirratum*, off Recife, Northeast Brazil: a combined survey with longline and acoustic telemetry. *Environmental Biology of Fishes*, 96(6): 735-745.
- Gleiss, A. C., Norman, B., Liebsch, N., Francis, C. and Wilson, R. P. (2009). A new prospect for tagging large free-swimming sharks with motion-sensitive data-loggers. *Fisheries Research*, 97(1-2): 11-16.
- Heupel, M.R., Simpfendorfer, C.A., Espinoza, M., Smoothey, A.F., Tobin, A., Peddemors, V. (2015). Conservation challenges of sharks with continental scale migrations. *Frontiers in Marine Science*, 2(12):1-7.
- Lowe C.G., Lyons K., Jarvis E., Winkler, C., White, C., Weng, K., Jorgensen, S., O' Sullivan. (2014). Movement patterns, habitat use, and fishery interactions of juvenile white sharks in southern California. In: *Sharks International 2014*, Durban, 124.
- Mineta, T., Kobayashi, S., Watanabe, Y., Kanauchi, S., Nakagawa, I., Suganuma, E. and Esashi, M. (1996) 'Three-axis capacitive accelerometer with uniform axial sensitivities ', *Journal of Micromechanics and Microengineering*, 6, 431
- Nakamura, I., Watanabe, Y., Papastamatiou, Y., Sato, K. and Meyer, C. (2011) 'Yo-yo vertical movements suggest a foraging strategy for tiger sharks *Galeocerdo cuvier*', *Marine Ecology Progress Series*, 424, 237–246
- Papastamatiou, Y.P., Itano, D.G., Dale, J.J., Meyer, C.G., Holland, K.N. (2010). Site fidelity and movements of sharks associated with ocean-farming cages in Hawaii. *Marine and Freshwater Research*, 61: 1366-75.
- Speed, C.W., Meekan, M.G., Field, I.C., McMahon, C.R., Stevens, J.D., McGregor, F., Huveneers, C., Berger, Y., Bradshaw, C.J.A. (2011). Spatial and temporal movement patterns of a multi-species coastal reef shark aggregation. *Marine Ecology Progress Series*, 429: 261-275.

# Foreign Fishing Vessel Licence Approval Form Scientific Research

Year: 2018 Country: USA

Vessel Name: OCEARCH

Research objectives: Expedition Nova Scotia – F2017-120

Location of fishing activity: 5ZE, 4X, 4VsW

Gear: Hook and Line, Mousetrap Drum Rig, Specially designed Lift System, Chase Boats and other oceanographic equipment

Dates of fishing activity: September 1 to October 31, 2018

## 1. To be completed by Science Branch

(1) Does this research activity contribute to:

- |                                      |              |              |                   |
|--------------------------------------|--------------|--------------|-------------------|
| • Canadian scientific community      | Yes <u>X</u> | No <u>  </u> | Unknown <u>  </u> |
| • Canadian industry                  | Yes <u>X</u> | No <u>  </u> | Unknown <u>  </u> |
| • International scientific community | Yes <u>X</u> | No <u>  </u> | Unknown <u>  </u> |

(2) Will Canadian scientists have access to the research data

Yes X No   

(3) Will Canadian scientists be participating

Yes    No X

(4) Primary species at which research is directed

Shark Species including White Shark

- |                                    |               |              |     |
|------------------------------------|---------------|--------------|-----|
| • highly transboundary as adult    | Yes <u>  </u> | No <u>  </u> | n/a |
| • somewhat transboundary as adult  | Yes <u>X</u>  | No <u>  </u> |     |
| • sedentary as adult               | Yes <u>  </u> | No <u>  </u> | n/a |
| • endangered or threatened species | Yes <u>  </u> | No <u>  </u> | n/a |

(5) Has this or a similar request been approved in previous years,  
i. e. long-term data series

Yes X No   

(6) Comments:

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Recommend Approval Yes    No   

Alain Vezina  
Regional Director, Science

## 2. To be completed by Ecosystem Management

(1) Does the area of research activity fall within the boundaries of any:

- |   |     |
|---|-----|
| • Marine Protected Area (MPA)                                 | N/A |
| • area closed to Canadian fishers because of habitat concerns | N/A |
| • integrated management area                                  | N/A |
| • area with habitat sensitivities                             | N/A |

(2) If yes to a MPA, does the research support the MPA objectives?

N/A

- (3) If yes to any other area, could the research activity be carried out with minimal impact because of the gear type or with restrictions

Yes (see note below)

**Comments:**

Cetacean conditions

- R/V to adhere to guidance contained in Canadian Coast Guard Annual Notice to Mariners: 5. GENERAL GUIDELINES FOR AQUATIC SPECIES at RISK AND IMPORTANT MARINE MAMMAL AREAS: Grand Manan Basin Critical Habitat and Roseway Basin Critical Habitat/Area To Be Avoided.
- While in vicinity of Bay of Fundy Vessel Traffic Services Zone, R/V to record and report North Atlantic right whale sightings to Canadian Coast Guard (Fundy Traffic, Channel 14). All whale records (post voyage) to be submitted to DFO (Contact: Danielle MacDonald, (506) 529-5725, [XMARWhalesightings@dfo-mpo.gc.ca](mailto:XMARWhalesightings@dfo-mpo.gc.ca)).

Recommend Approval

Yes \_\_\_

No \_\_\_

\_\_\_\_\_  
**Glen Herbert**  
**for the Regional Director**  
**Ecosystem Management**

**3. To be completed by Fisheries Management**

- (1) Will Canadian observers be on board Yes \_\_\_ No X
- (2) Have appropriate Canadian industry representatives been notified of the research activity Yes X No \_\_\_

List contacts: \_\_\_\_\_

- (3) Is the Canadian industry in support of the research activity Yes \_\_\_ No \_\_\_ N/A
- (4) Will the research activity likely impact or interfere with ongoing Canadian fisheries Yes \_\_\_ No X

(4) Comments:

**Additional C&P Conditions:**

- 
1. Swordfish longline gear may be in the area, if so, there are AIS beacons on the gear.
- 
2. Beacons from a licence holder have the same vessel prefix on each beacon
- 
3. There will be a string of beacons in a line. It is not possible to sample between beacons. It would be possible to sample a suitable distance alongside the set.
-

Recommend Approval      Yes \_\_\_\_      No \_\_\_\_ <sup>3</sup>

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**Annette Daley**  
**A/Regional Director,**  
**Fisheries Management**

**Deadline for approval/non-approval: May 26, 2018**

Approved \_\_\_\_      Not Approved \_\_\_\_

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**Mary-Ellen Valkenier**  
**Regional Director General**  
**Maritimes Region**  
**Fisheries & Oceans Canada**

Date: May 16, 2017

**Additional Conditions:**

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**Merriman, Catherine B**

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**From:** Merriman, Catherine B  
**Sent:** May-22-18 4:05 PM  
**To:** Waters, Christa  
**Cc:** Sweet, Marilyn  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Did they submit a separate application for possession of whale / cetacean remains? They told me they would like to have access to remains from necropsies including right whales – muscle, blubber, guts whatever – because they would use it as bait, to chum for white sharks. Apparently they have a licence from NOAA to do this in the U.S., and collaborate with stranding response groups. They can't bring that material across the border which is why they hope to get a Canadian permit.

Cathy

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**From:** Waters, Christa  
**Sent:** May-22-18 3:58 PM  
**To:** Merriman, Catherine B  
**Subject:** FW: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)  
**Importance:** High

FYI

**Christa Waters**

Regional Senior Fisheries Management Advisor  
Resource Management | Gestion des Pêches  
Maritimes Region | Région des Maritimes  
Telephone | Téléphone 902-293-6541

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**From:** MacDonald, Carl  
**Sent:** May-22-18 3:52 PM  
**To:** Doherty, Penny; Goshulak, Larissa; Hayman, Timothy; Quigley, Sara; Reeves, Alan; Saunders, Jennifer; Soomai, Suzuette; Spence, Koren R; Stevens, Greg; Sweet, Marilyn; Macdonald, Claire; Fraser, Matthew J  
**Cc:** Waters, Christa  
**Subject:** FW: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)  
**Importance:** High

Hi All,

Any concerns with this research from your fisheries standpoint. If so, Please advise me by May 25.

Regards,

Carl MacDonald  
Resource Management  
Fisheries & Oceans Canada | Government of Canada  
[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca) | Tel: 902-293-8257 | Fax: 902-426-7967



Regional agent principal de gestion des peches, Gestion des ressources  
Pêches et Océans Canada | Gouvernement du Canada  
[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca) | Tél: 902-293-8257 | Télécopieur: 902-426-7967

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**From:** Licence Maritimes / Permis Maritimes (DFO/MPO)  
**Sent:** 2018-May-18 10:24 AM  
**To:** Vézina, Alain; Herbert, Glen; Pye, Brad; MacDonald, Carl  
**Cc:** Daley, Annette  
**Subject:** FW: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)  
**Importance:** High

Good morning – the response time has been changed to June 1<sup>st</sup> instead of the original August 1<sup>st</sup> request.

Please review and provide comments/approval for the attached Foreign Vessel Cruise for Scientific Research (Shark species including White Shark).

I have asked NCR to have the applicant provide us with a Map of the Area to be studied, as the areas are only recorded under section 3 of the application. Placentia Bay, Nfld is listed, but as we do not licence vessels for other waters, I will notify Nfld licensing that this application will be reviewed and no doubt, approved for our waters. If Nfld requests that Placentia Bay be included, we will do that.

Thanks and have a nice day!

Charlene Cleveland  
Regional Officer, Licensing Services  
Dept of Fisheries & Oceans  
Dartmouth, Nova Scotia  
Tel: (902) 426-9966  
Fax: (902) 426-5010  
[Licence.maritimes.permis@dfo-mpo.gc.ca](mailto:Licence.maritimes.permis@dfo-mpo.gc.ca)

---

**From:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO)  
**Sent:** 2017-November-30 1:14 PM  
**To:** Licence Maritimes / Permis Maritimes (DFO/MPO); Duggan, Charmaine; Kean, Jackie; Bowdring, Tony  
**Cc:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO); Lavigne, Élise; Farr, Connie; Chmiel, Jim;  
[HlxEcareg1@innav.gc.ca](mailto:HlxEcareg1@innav.gc.ca)  
**Subject:** IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Good afternoon,

Please see attached US Marine Scientific Research (MSR) request for the **OCEARCH, Sep 1 – Oct 31, 2018**. It appears as though the proponent intends to conduct work in both Newfoundland and Maritimes Regions (though primarily in Maritimes).

The vessel intends to call on Halifax, NS, between **Sep 9 – Oct 31, 2018**, for provisioning.

We kindly request all responses by **August 1, 2018**.

Best wishes,

Andrew

No information has been removed or severed from this page

**Cleveland, Charlene**

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**From:** Herbert, Glen  
**Sent:** 2018-May-23 1:47 PM  
**To:** Vézina, Alain; MacDonald, Carl; Licence Maritimes / Permis Maritimes (DFO/MPO); Pye, Brad  
**Cc:** Daley, Annette; Berthier, Jacinta  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

**Follow Up Flag:** Follow up  
**Flag Status:** Completed

I will go back to SARMD on their permit and make them aware of these concerns from Science.

---

Glen Herbert  
 Regional Manager  
 Oceans and Coastal Management Division  
 Ecosystem Management Branch  
 Fisheries and Oceans Canada – Maritimes Region  
 Bedford Institute of Oceanography  
 1 Challenger Dr., PO Box 1006  
 5th Floor, Polaris Bldg.  
 Dartmouth, NS, B2Y 4A2  
 Tel: (902) 802 7051  
 Email: [glen.herbert@dfo-mpo.gc.ca](mailto:glen.herbert@dfo-mpo.gc.ca)

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**From:** Vézina, Alain  
**Sent:** May-23-18 1:37 PM  
**To:** MacDonald, Carl; Licence Maritimes / Permis Maritimes (DFO/MPO); Herbert, Glen; Pye, Brad  
**Cc:** Daley, Annette; Berthier, Jacinta  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

With respect to the questions on the science section of the approval form:

This research activity will **not** contribute to the Canadian scientific community. Canadian collaborators do not see the benefit of working with Ocearch, even though they have contacted all major Atlantic Universities (Dal, Memorial, Acadia etc), DFO (Heather Bowlby, Mark Simpson), non-profits (Grand Manan Seabird and Whale Research), OTN over the last 2 years. As pointed out by Carl, Heather holds a SARA permit and has an equivalent tagging program for white shark (aka duplication of research effort on a single population of an endangered species). The area that Heather works out of is the outside of St. Margret's Bay or immediately adjacent to Mahone Bay. The main tag type they use is optimized for instantaneous geolocation (excellent opportunities for twitter) but gives no information on habitat use – as needed for SARA research questions.

Canadian scientists will **not** have access to the research data.

Based on this information, I cannot recommend approval at this time. The amended approval form is attached.

Although I did not change the response in the form, I have no record of a previous approval for this organization.

Outside of my purview, but I understand that the SARA permit requires a DFO observer during at least part of their trip. How will that condition be fulfilled?

Alain

**From:** MacDonald, Carl

**Sent:** May 23, 2018 10:32 AM

**To:** Licence Maritimes / Permis Maritimes (DFO/MPO) <RegionalLicensing.XMAR@dfo-mpo.gc.ca>; Vézina, Alain <Alain.Vezina@dfo-mpo.gc.ca>; Herbert, Glen <Glen.Herbert@dfo-mpo.gc.ca>; Pye, Brad <Brad.Pye@dfo-mpo.gc.ca>

**Cc:** Daley, Annette <Annette.Daley@dfo-mpo.gc.ca>; Berthier, Jacinta <Jacinta.Berthier@dfo-mpo.gc.ca>

**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

**Questions/Comments Regarding Proposed Research:**

- Would it be possible for the researcher to describe the bait type they propose to use? ie Will the researcher be using Marine Mammal parts for Bait? If so, where will this Marine Mammal bait be acquired?
- Would it be possible for the researcher to be more specific regarding the shark species intended for this research? Currently the document only indicates Shark Species - including White Shark.
- It is important to note that Canadian shark researcher (Heather Bowlby) has been approved to conducted research on the same species (White Shark) in the same area (Mahone Bay).

Regards,

Carl MacDonald

Resource Management

Fisheries & Oceans Canada | Government of Canada

[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca) | Tel: 902-293-8257 | Fax: 902-426-7967

Regional agent principal de gestion des peches, Gestion des ressources

Pêches et Océans Canada | Gouvernement du Canada

[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca) | Tél: 902-293-8257 | Télécopieur: 902-426-7967

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**From:** MacDonald, Carl

**Sent:** 2018-May-22 4:06 PM

**To:** Licence Maritimes / Permis Maritimes (DFO/MPO); Vézina, Alain; Herbert, Glen; Pye, Brad

**Cc:** Daley, Annette

**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

**Large Pelagic Comments:**

1. *Large pelagic sector.* Pelagic longline fishing takes place along the edge of the Scotian Shelf where the large pelagic fleet conducts operations. Caution must be taken to ensure that the scientific research vessel does not cross previously deployed pelagic longlines which run near the surface for distances of

30 - 40 nm. Damaged gear and identifying marks are to be reported to DFO ([Brad.Pye@dfo-mpo.gc.ca](mailto:Brad.Pye@dfo-mpo.gc.ca)) immediately. Vessel is to continuously broadcast an AIS signal.

- Swordfish longline gear may be in other areas.
- Pelagic Longline Gear have AIS beacons attached.
- Beacons from a licence holder have the same vessel prefix on each beacon
- There will be a string of beacons on a line. It is not possible to travel between the beacons with the research vessel.
- It is possible to travel a suitable distance alongside a pelagic longline set.

Regards,

Carl MacDonald  
Resource Management  
Fisheries & Oceans Canada | Government of Canada  
[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca) | Tel: 902-293-8257 | Fax: 902-426-7967

Regional agent principal de gestion des peches, Gestion des ressources  
Pêches et Océans Canada | Gouvernement du Canada  
[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca) | Tél: 902-293-8257 | Télécopieur: 902-426-7967

---

**From:** Licence Maritimes / Permis Maritimes (DFO/MPO)  
**Sent:** 2018-May-18 10:24 AM  
**To:** Vézina, Alain; Herbert, Glen; Pye, Brad; MacDonald, Carl  
**Cc:** Daley, Annette  
**Subject:** FW: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)  
**Importance:** High

Good morning – the response time has been changed to **June 1<sup>st</sup>** instead of the original **August 1<sup>st</sup>** request.

Please review and provide comments/approval for the attached Foreign Vessel Cruise for Scientific Research (Shark species including White Shark).

I have asked NCR to have the applicant provide us with a Map of the Area to be studied, as the areas are only recorded under section 3 of the application. Placentia Bay, Nfld is listed, but as we do not licence vessels for other waters, I will notify Nfld licensing that this application will be reviewed and no doubt, approved for our waters. If Nfld requests that Placentia Bay be included, we will do that.

Thanks and have a nice day!

Charlene Cleveland  
Regional Officer, Licensing Services  
Dept of Fisheries & Oceans  
Dartmouth, Nova Scotia  
Tel: (902) 426-9966  
Fax: (902) 426-5010  
[Licence.maritimes.permis@dfo-mpo.gc.ca](mailto:Licence.maritimes.permis@dfo-mpo.gc.ca)

---

**From:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO)

**Sent:** 2017–November-30 1:14 PM

**To:** Licence Maritimes / Permis Maritimes (DFO/MPO); Duggan, Charmaine; Kean, Jackie; Bowdring, Tony

**Cc:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO); Lavigne, Élise; Farr, Connie; Chmiel, Jim;  
[HlxEcareg1@innav.gc.ca](mailto:HlxEcareg1@innav.gc.ca)

**Subject:** IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Good afternoon,

Please see attached US Marine Scientific Research (MSR) request for the **OCEARCH, Sep 1 – Oct 31, 2018**. It appears as though the proponent intends to conduct work in both Newfoundland and Maritimes Regions (though primarily in Maritimes).

The vessel intends to call on Halifax, NS, between **Sep 9 – Oct 31, 2018**, for provisioning.

We kindly request all responses by **August 1, 2018**.

Best wishes,

Andrew

## Cleveland, Charlene

---

**From:** Licence Maritimes / Permis Maritimes (DFO/MPO)  
**Sent:** 2018-May-24 10:09 AM  
**To:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO); Brammer, Andrew  
**Subject:** FW: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Good morning – please see the e-mail below from Carl MacDonald, Resource Senior Advisor for Large Pelagic. Please submit to the researchers involved in this cruise for the information requested.

Regards,

Charlene Cleveland  
Regional Officer, Licensing Services  
Dept of Fisheries & Oceans  
Dartmouth, Nova Scotia  
Tel: (902) 426-9966  
Fax: (902) 426-5010  
[Licence.maritimes.permis@dfo-mpo.gc.ca](mailto:Licence.maritimes.permis@dfo-mpo.gc.ca)

---

**From:** MacDonald, Carl  
**Sent:** 2018-May-23 10:32 AM  
**To:** Licence Maritimes / Permis Maritimes (DFO/MPO); Vézina, Alain; Herbert, Glen; Pye, Brad  
**Cc:** Daley, Annette; Berthier, Jacinta  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

### Questions/Comments Regarding Proposed Research:

- Would it be possible for the researcher to describe the bait type they propose to use? ie Will the researcher be using Marine Mammal parts for Bait? If so, where will this Marine Mammal bait be acquired?
- Would it be possible for the researcher to be more specific regarding the shark species intended for this research? Currently the document only indicates Shark Species - including White Shark.
- It is important to note that Canadian shark researcher (Heather Bowlby) has been approved to conducted research on the same species (White Shark) in the same area (Mahone Bay).

Regards,

Carl MacDonald  
Resource Management  
Fisheries & Oceans Canada | Government of Canada  
[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca) | Tel: 902-293-8257 | Fax: 902-426-7967

Regional agent principal de gestion des peches, Gestion des ressources  
Pêches et Océans Canada | Gouvernement du Canada  
[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca) | Tél: 902-293-8257 | Télécopieur: 902-426-7967

---

**From:** MacDonald, Carl  
**Sent:** 2018-May-22 4:06 PM  
**To:** Licence Maritimes / Permis Maritimes (DFO/MPO); Vézina, Alain; Herbert, Glen; Pye, Brad  
**Cc:** Daley, Annette  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Large Pelagic Comments:

1. *Large pelagic sector.* Pelagic longline fishing takes place along the edge of the Scotian Shelf where the large pelagic fleet conducts operations. Caution must be taken to ensure that the scientific research vessel does not cross previously deployed pelagic longlines which run near the surface for distances of 30 - 40 nm. Damaged gear and identifying marks are to be reported to DFO ([Brad.Pye@dfo-mpo.gc.ca](mailto:Brad.Pye@dfo-mpo.gc.ca)) immediately. Vessel is to continuously broadcast an AIS signal.
  - Swordfish longline gear may be in other areas.
  - Pelagic Longline Gear have AIS beacons attached.
  - Beacons from a licence holder have the same vessel prefix on each beacon [REDACTED]
  - There will be a string of beacons on a line. It is not possible to travel between the beacons with the research vessel.
  - It is possible to travel a suitable distance alongside a pelagic longline set.

Regards,

Carl MacDonald  
Resource Management  
Fisheries & Oceans Canada | Government of Canada  
[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca) | Tel: 902-293-8257 | Fax: 902-426-7967

Regional agent principal de gestion des peches, Gestion des ressources  
Pêches et Océans Canada | Gouvernement du Canada  
[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca) | Tél: 902-293-8257 | Télécopieur: 902-426-7967

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**To:** Vézina, Alain; Herbert, Glen; Pye, Brad; MacDonald, Carl  
**Cc:** Daley, Annette  
**Subject:** FW: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)  
**Importance:** High

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Fax: (902) 426-5010  
[Licence.maritimes.permis@dfo-mpo.gc.ca](mailto:Licence.maritimes.permis@dfo-mpo.gc.ca)

---

**From:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO)  
**Sent:** 2017–November-30 1:14 PM  
**To:** Licence Maritimes / Permis Maritimes (DFO/MPO); Duggan, Charmaine; Kean, Jackie; Bowdring, Tony  
**Cc:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO); Lavigne, Élise; Farr, Connie; Chmiel, Jim; HlxEcareg1@innav.gc.ca  
**Subject:** IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Good afternoon,

Please see attached US Marine Scientific Research (MSR) request for the **OCEARCH, Sep 1 – Oct 31, 2018**. It appears as though the proponent intends to conduct work in both Newfoundland and Maritimes Regions (though primarily in Maritimes).

The vessel intends to call on Halifax, NS, between **Sep 9 – Oct 31, 2018**, for provisioning.

We kindly request all responses by **August 1, 2018**.

Best wishes,

Andrew

## MacLellan, Elizabeth

---

**From:** Daley, Annette  
**Sent:** Thursday, May 24, 2018 11:43 AM  
**To:** King, Rhea L  
**Subject:** Re: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Thx - I was briefed on this one when in EM.

Annette Daley  
A/Regional Director, Fisheries Management  
Fisheries and Oceans Canada | Government of Canada  
Annette.Daley@dfo-mpo.gc.ca |  
Telephone: 902-426-9962 | Facsimile: 902-426-7967

Directrice régionale par interim, Gestion des pêches  
Pêches et Océans Canada | Gouvernement du Canada  
Annette.Daley@dfo-mpo.gc.ca |  
Téléphone: 902-426-9962 | Télécopieur: 902-426-7967

---

**From:** King, Rhea L  
**Sent:** Thursday, May 24, 2018 10:56 AM  
**To:** Daley, Annette  
**Subject:** Fw: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Fyi

---

**From:** Humphrey, Donald <Donald.Humphrey@dfo-mpo.gc.ca>  
**Sent:** Thursday, May 24, 2018 10:34 AM  
**To:** King, Rhea L  
**Subject:** FW: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Hi Rhea, we recently approved a SARA permit for a US organization that is interested in coming to Canada to undertake research on White Sharks. They are going through RM/Science for other necessary permits and Science has expressed some concerns (see below). We anticipated this might come up, so some draft media lines have been prepared. Let me know if you (or Annette) would like some additional context and advice.

Donald

---

**From:** MacDonald, Jennifer  
**Sent:** May-24-18 7:55 AM  
**To:** Humphrey, Donald  
**Subject:** FW: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

FYI

**Jennifer MacDonald**  
Species at Risk Management Division  
(902) 407-8175

---

**From:** Herbert, Glen  
**Sent:** May-23-18 1:48 PM  
**To:** MacDonald, Jennifer  
**Subject:** FW: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

[REDACTED]

---

Glen Herbert  
Regional Manager  
Oceans and Coastal Management Division  
Ecosystem Management Branch  
Fisheries and Oceans Canada – Maritimes Region  
Bedford Institute of Oceanography  
1 Challenger Dr., PO Box 1006  
5th Floor, Polaris Bldg.  
Dartmouth, NS, B2Y 4A2  
Tel: (902) 802 7051  
Email: [glen.herbert@dfo-mpo.gc.ca](mailto:glen.herbert@dfo-mpo.gc.ca)

---

**From:** Vézina, Alain  
**Sent:** May-23-18 1:37 PM  
**To:** MacDonald, Carl; Licence Maritimes / Permis Maritimes (DFO/MPO); Herbert, Glen; Pye, Brad  
**Cc:** Daley, Annette; Berthier, Jacinta  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

With respect to the questions on the science section of the approval form:

This research activity will **not** contribute to the Canadian scientific community. Canadian collaborators do not see the benefit of working with Ocearch, even though they have contacted all major Atlantic Universities (Dal, Memorial, Acadia etc), DFO (Heather Bowlby, Mark Simpson), non-profits (Grand Manan Seabird and Whale Research), OTN over the last 2 years. As pointed out by Carl, Heather holds a SARA permit and has an equivalent tagging program for white shark (aka duplication of research effort on a single population of an endangered species). The area that Heather works out of is the outside of St. Margret's Bay or immediately adjacent to Mahone Bay. The main tag type they use is optimized for instantaneous geolocation (excellent opportunities for twitter) but gives no information on habitat use – as needed for SARA research questions.

Canadian scientists will **not** have access to the research data. [REDACTED]

[REDACTED]

Based on this information, I cannot recommend approval at this time. The amended approval form is attached.

Although I did not change the response in the form, I have no record of a previous approval for this organization.

Outside of my purview, but I understand that the SARA permit requires a DFO observer during at least part of their trip. How will that condition be fulfilled?

[REDACTED]

Alain

**From:** MacDonald, Carl

**Sent:** May 23, 2018 10:32 AM

**To:** Licence Maritimes / Permis Maritimes (DFO/MPO) <RegionalLicensing.XMAR@dfo-mpo.gc.ca>; Vézina, Alain <Alain.Vezina@dfo-mpo.gc.ca>; Herbert, Glen <Glen.Herbert@dfo-mpo.gc.ca>; Pye, Brad <Brad.Pye@dfo-mpo.gc.ca>

**Cc:** Daley, Annette <Annette.Daley@dfo-mpo.gc.ca>; Berthier, Jacinta <Jacinta.Berthier@dfo-mpo.gc.ca>

**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Questions/Comments Regarding Proposed Research:

- Would it be possible for the researcher to describe the bait type they propose to use? ie Will the researcher be using Marine Mammal parts for Bait? If so, where will this Marine Mammal bait be acquired?
- Would it be possible for the researcher to be more specific regarding the shark species intended for this research? Currently the document only indicates Shark Species - including White Shark.
- It is important to note that Canadian shark researcher (Heather Bowlby) has been approved to conducted research on the same species (White Shark) in the same area (Mahone Bay).

Regards,

Carl MacDonald

Resource Management

Fisheries & Oceans Canada | Government of Canada

[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca) | Tel: 902-293-8257 | Fax: 902-426-7967

Regional agent principal de gestion des peches, Gestion des ressources

Pêches et Océans Canada | Gouvernement du Canada

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---

**From:** MacDonald, Carl

**Sent:** 2018-May-22 4:06 PM

**To:** Licence Maritimes / Permis Maritimes (DFO/MPO); Vézina, Alain; Herbert, Glen; Pye, Brad

**Cc:** Daley, Annette

**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Large Pelagic Comments:

1. *Large pelagic sector.* Pelagic longline fishing takes place along the edge of the Scotian Shelf where the large pelagic fleet conducts operations. Caution must be taken to ensure that the scientific research vessel does not cross previously deployed pelagic longlines which run near the surface for distances of 30 - 40 nm. Damaged gear and identifying marks are to be reported to DFO ([Brad.Pye@dfo-mpo.gc.ca](mailto:Brad.Pye@dfo-mpo.gc.ca)) immediately. Vessel is to continuously broadcast an AIS signal.
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Regards,

Carl MacDonald  
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Fisheries & Oceans Canada | Government of Canada  
[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca) | Tel: 902-293-8257 | Fax: 902-426-7967

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Thanks and have a nice day!

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Dept of Fisheries & Oceans  
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Fax: (902) 426-5010  
[Licence.maritimes.permanis@dfo-mpo.gc.ca](mailto:Licence.maritimes.permanis@dfo-mpo.gc.ca)

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**From:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO)  
**Sent:** 2017-November-30 1:14 PM  
**To:** Licence Maritimes / Permis Maritimes (DFO/MPO); Duggan, Charmaine; Kean, Jackie; Bowdring, Tony  
**Cc:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO); Lavigne, Élise; Farr, Connie; Chmiel, Jim;  
[HlxEcarg1@innav.gc.ca](mailto:HlxEcarg1@innav.gc.ca)  
**Subject:** IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Good afternoon,

Please see attached US Marine Scientific Research (MSR) request for the **OCEARCH, Sep 1 – Oct 31, 2018**. It appears as though the proponent intends to conduct work in both Newfoundland and Maritimes Regions (though primarily in Maritimes).

The vessel intends to call on Halifax, NS, between **Sep 9 – Oct 31, 2018**, for provisioning.

We kindly request all responses by **August 1, 2018**.

Best wishes,

Andrew

# Foreign Fishing Vessel Licence Approval Form Scientific Research

Year: 2018 Country: USA

Vessel Name: OCEARCH

Research objectives: Expedition Nova Scotia – F2017-120

Location of fishing activity: 5ZE, 4X, 4VsW

Gear: Hook and Line, Mousetrap Drum Rig, Specially designed Lift System, Chase Boats and other oceanographic equipment

Dates of fishing activity: September 1 to October 31, 2018

## 1. To be completed by Science Branch

(1) Does this research activity contribute to:

- |                                      |                              |  |   |
|--------------------------------------|------------------------------|--|---|
| • Canadian scientific community      | Yes <input type="checkbox"/> | No <input checked="" type="checkbox"/> | Unknown <input type="checkbox"/>            |
| • Canadian industry                  | Yes <input type="checkbox"/> | No <input type="checkbox"/>            | Unknown <input checked="" type="checkbox"/> |
| • International scientific community | Yes <input type="checkbox"/> | No <input type="checkbox"/>            | Unknown <input checked="" type="checkbox"/> |

(2) Will Canadian scientists have access to the research data

Yes ☐ No ☒

(3) Will Canadian scientists be participating

Yes ☐ No ☒

(4) Primary species at which research is directed

Shark Species including White Shark

- |                                    |   |                             |     |
|------------------------------------|---|-----------------------------|-----|
| • highly transboundary as adult    | Yes <input type="checkbox"/>            | No <input type="checkbox"/> | n/a |
| • somewhat transboundary as adult  | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/> |     |
| • sedentary as adult               | Yes <input type="checkbox"/>            | No <input type="checkbox"/> | n/a |
| • endangered or threatened species | Yes <input type="checkbox"/>            | No <input type="checkbox"/> | n/a |

(5) Has this or a similar request been approved in previous years, i. e. long-term data series

Yes ☒ No ☐

(6) Comments:

Recommend Approval Yes ☐ No ☒

Alain Vezina  
Regional Director, Science

## 2. To be completed by Ecosystem Management

(1) Does the area of research activity fall within the boundaries of any:

- |   |     |
|---|-----|
| • Marine Protected Area (MPA)                                 | N/A |
| • area closed to Canadian fishers because of habitat concerns | N/A |
| • integrated management area                                  | N/A |
| • area with habitat sensitivities                             | N/A |

(2) If yes to a MPA, does the research support the MPA objectives?

N/A

- (3) If yes to any other area, could the research activity be carried out with minimal impact because of the gear type or with restrictions

Yes (see note below)

**Comments:**

**Cetacean conditions**

- R/V to adhere to guidance contained in Canadian Coast Guard Annual Notice to Mariners: 5. GENERAL GUIDELINES FOR AQUATIC SPECIES at RISK AND IMPORTANT MARINE MAMMAL AREAS: Grand Manan Basin Critical Habitat and Roseway Basin Critical Habitat/Area To Be Avoided.
- While in vicinity of Bay of Fundy Vessel Traffic Services Zone, R/V to record and report North Atlantic right whale sightings to Canadian Coast Guard (Fundy Traffic, Channel 14). All whale records (post voyage) to be submitted to DFO (Contact: Danielle MacDonald, (506) 529-5725, [XMARWhalesightings@dfo-mpo.gc.ca](mailto:XMARWhalesightings@dfo-mpo.gc.ca)).

Recommend Approval

Yes\_\_\_

No \_\_\_

\_\_\_\_\_  
**Glen Herbert**  
**for the Regional Director**  
**Ecosystem Management**

**3. To be completed by Fisheries Management**

- (1) Will Canadian observers be on board Yes \_\_\_ No X
- (2) Have appropriate Canadian industry representatives been notified of the research activity Yes X No \_\_\_

List contacts: \_\_\_\_\_

- (3) Is the Canadian industry in support of the research activity Yes \_\_\_ No \_\_\_ N/A
- (4) Will the research activity likely impact or interfere with ongoing Canadian fisheries Yes \_\_\_ No X

(4) Comments:

**Additional C&P Conditions:**

- 
1. Swordfish longline gear may be in the area, if so, there are AIS beacons on the gear.
- 
2. Beacons from a licence holder have the same vessel prefix on each beacon (example, Ivy Rose would have beacon labelled IR-01 to IR-20).
- 
3. There will be a string of beacons in a line. It is not possible to sample between beacons. It would be possible to sample a suitable distance alongside the set.
-



Recommend Approval                      Yes \_\_\_\_                      No \_\_\_\_                      3

\_\_\_\_\_  
**Annette Daley**  
**A/Regional Director,**  
**Fisheries Management**

**Deadline for approval/non-approval: May 26, 2018**

Approved \_\_\_\_                      Not Approved \_\_\_\_

\_\_\_\_\_  
**Mary-Ellen Valkenier**  
**Regional Director General**  
**Maritimes Region**  
**Fisheries & Oceans Canada**

Date: May 16, 2017

**Additional Conditions:**

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

## Cleveland, Charlene

---

**From:** Farr, Connie  
**Sent:** 2018-May-24 12:22 PM  
**To:** Cleveland, Charlene  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

[REDACTED]  
[REDACTED] CC me and Verna so she is aware that it may become an issue.

Tks

Connie

---

**From:** Licence Maritimes / Permis Maritimes (DFO/MPO)  
**Sent:** May-24-18 11:19 AM  
**To:** Farr, Connie  
**Subject:** FW: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)  
**Importance:** High

Hi Connie – this is the 1<sup>st</sup> – Alain Vezina DOES NOT APPROVE. What do we do with this?

Carl MacDonald also has concerns, which I have sent back to NCR and Andrew Brammer for a response from the researchers.

Charlene

---

**From:** Vézina, Alain  
**Sent:** 2018-May-23 1:37 PM  
**To:** MacDonald, Carl; Licence Maritimes / Permis Maritimes (DFO/MPO); Herbert, Glen; Pye, Brad  
**Cc:** Daley, Annette; Berthier, Jacinta  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

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This research activity will **not** contribute to the Canadian scientific community. Canadian collaborators do not see the benefit of working with Ocearch, even though they have contacted all major Atlantic Universities (Dal, Memorial, Acadia etc), DFO (Heather Bowlby, Mark Simpson), non-profits (Grand Manan Seabird and Whale Research), OTN over the last 2 years. As pointed out by Carl, Heather holds a SARA permit and has an equivalent tagging program for white shark (aka duplication of research effort on a single population of an endangered species). The area that Heather works out of is the outside of St. Margret's Bay or immediately adjacent to Mahone Bay. The main tag type they use is optimized for instantaneous geolocation (excellent opportunities for twitter) but gives no information on habitat use – as needed for SARA research questions.

Canadian scientists will **not** have access to the research data. [REDACTED]  
[REDACTED]

Based on this information, I cannot recommend approval at this time. The amended approval form is attached.

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Outside of my purview, but I understand that the SARA permit requires a DFO observer during at least part of their trip. How will that condition be fulfilled?

Alain

**From:** MacDonald, Carl

**Sent:** May 23, 2018 10:32 AM

**To:** Licence Maritimes / Permis Maritimes (DFO/MPO) <RegionalLicensing.XMAR@dfo-mpo.gc.ca>; Vézina, Alain

<Alain.Vezina@dfo-mpo.gc.ca>; Herbert, Glen <Glen.Herbert@dfo-mpo.gc.ca>; Pye, Brad <Brad.Pye@dfo-mpo.gc.ca>

**Cc:** Daley, Annette <Annette.Daley@dfo-mpo.gc.ca>; Berthier, Jacinta <Jacinta.Berthier@dfo-mpo.gc.ca>

**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

**Questions/Comments Regarding Proposed Research:**

- Would it be possible for the researcher to describe the bait type they propose to use? ie Will the researcher be using Marine Mammal parts for Bait? If so, where will this Marine Mammal bait be acquired?
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Regards,

Carl MacDonald

Resource Management

Fisheries & Oceans Canada | Government of Canada

[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca) | Tel: 902-293-8257 | Fax: 902-426-7967

Regional agent principal de gestion des peches, Gestion des ressources

Pêches et Océans Canada | Gouvernement du Canada

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---

**From:** MacDonald, Carl

**Sent:** 2018-May-22 4:06 PM

**To:** Licence Maritimes / Permis Maritimes (DFO/MPO); Vézina, Alain; Herbert, Glen; Pye, Brad

**Cc:** Daley, Annette

**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

**Large Pelagic Comments:**

1. *Large pelagic sector.* Pelagic longline fishing takes place along the edge of the Scotian Shelf where the large pelagic fleet conducts operations. Caution must be taken to ensure that the scientific research vessel does not cross previously deployed pelagic longlines which run near the surface for distances of

30 - 40 nm. Damaged gear and identifying marks are to be reported to DFO ([Brad.Pye@dfo-mpo.gc.ca](mailto:Brad.Pye@dfo-mpo.gc.ca)) immediately. Vessel is to continuously broadcast an AIS signal.

- Swordfish longline gear may be in other areas.
- Pelagic Longline Gear have AIS beacons attached.
- Beacons from a licence holder have the same vessel prefix on each beacon [REDACTED]
- There will be a string of beacons on a line. It is not possible to travel between the beacons with the research vessel.
- It is possible to travel a suitable distance alongside a pelagic longline set.

Regards,

Carl MacDonald  
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---

**From:** Licence Maritimes / Permis Maritimes (DFO/MPO)  
**Sent:** 2018-May-18 10:24 AM  
**To:** Vézina, Alain; Herbert, Glen; Pye, Brad; MacDonald, Carl  
**Cc:** Daley, Annette  
**Subject:** FW: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)  
**Importance:** High

Good morning – the response time has been changed to **June 1<sup>st</sup>** instead of the original **August 1<sup>st</sup>** request.

Please review and provide comments/approval for the attached Foreign Vessel Cruise for Scientific Research (Shark species including White Shark).

I have asked NCR to have the applicant provide us with a Map of the Area to be studied, as the areas are only recorded under section 3 of the application. Placentia Bay, Nfld is listed, but as we do not licence vessels for other waters, I will notify Nfld licensing that this application will be reviewed and no doubt, approved for our waters. If Nfld requests that Placentia Bay be included, we will do that.

Thanks and have a nice day!

Charlene Cleveland  
Regional Officer, Licensing Services  
Dept of Fisheries & Oceans  
Dartmouth, Nova Scotia  
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Fax: (902) 426-5010  
[Licence.maritimes.permanis@dfo-mpo.gc.ca](mailto:Licence.maritimes.permanis@dfo-mpo.gc.ca)

---

**From:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO)

**Sent:** 2017–November-30 1:14 PM

**To:** Licence Maritimes / Permis Maritimes (DFO/MPO); Duggan, Charmaine; Kean, Jackie; Bowdring, Tony

**Cc:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO); Lavigne, Élise; Farr, Connie; Chmiel, Jim;  
[HlxEcareg1@innav.gc.ca](mailto:HlxEcareg1@innav.gc.ca)

**Subject:** IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Good afternoon,

Please see attached US Marine Scientific Research (MSR) request for the **OCEARCH, Sep 1 – Oct 31, 2018**. It appears as though the proponent intends to conduct work in both Newfoundland and Maritimes Regions (though primarily in Maritimes).

The vessel intends to call on Halifax, NS, between **Sep 9 – Oct 31, 2018**, for provisioning.

We kindly request all responses by **August 1, 2018**.

Best wishes,

Andrew

**Docherty, Verna**

---

**From:** Docherty, Verna  
**Sent:** May-25-18 3:34 PM  
**To:** Daley, Annette  
**Subject:** FW: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31, 2018)

FYI

---

**From:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO)  
**Sent:** May-25-18 3:33 PM  
**To:** Cleveland, Charlene  
**Cc:** Farr, Connie; Docherty, Verna; NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO)  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31, 2018)

Hi Charlene,

Thank you for the notification. No reply has been sent to Global Affairs as of yet.

We will standby awaiting further information.

Best,

Andrew

---

**From:** Cleveland, Charlene  
**Sent:** May-25-18 2:16 PM  
**To:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO); Brammer, Andrew  
**Cc:** Farr, Connie; Docherty, Verna  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31, 2018)  
**Importance:** High

Good afternoon – please advise if the Maritimes response has been forwarded to the OCEARCH organization. If not, please do not forward. This application is currently being revisited by our senior directors and we will advise you of the decision.

Please advise asap.

Thank you

Charlene Cleveland  
Regional Officer, Licensing Services  
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**From:** Cleveland, Charlene  
**Sent:** 2018-May-24 1:27 PM  
**To:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO); Brammer, Andrew

**Cc:** Farr, Connie; Docherty, Verna

**Subject:** FW: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018) - Not Approved

Good afternoon – please see the e-mail below from Alain Vezina, Regional Director of Science, Maritimes Region. The Oearch cruise is not approved and we will not be issuing a licence.

Please forward our response to the agency that submitted the application.

Regards,

Charlene Cleveland  
Regional Officer, Licensing Services  
Dept of Fisheries & Oceans  
Dartmouth, Nova Scotia  
Tel: (902) 426-9966  
Fax: (902) 426-5010  
[Licence.maritimes.permis@dfo-mpo.gc.ca](mailto:Licence.maritimes.permis@dfo-mpo.gc.ca)

---

**From:** Vézina, Alain

**Sent:** 2018-May-23 1:37 PM

**To:** MacDonald, Carl; Licence Maritimes / Permis Maritimes (DFO/MPO); Herbert, Glen; Pye, Brad

**Cc:** Daley, Annette; Berthier, Jacinta

**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018) - Not Approved

With respect to the questions on the science section of the approval form:

This research activity will **not** contribute to the Canadian scientific community. Canadian collaborators do not see the benefit of working with Oearch, even though they have contacted all major Atlantic Universities (Dal, Memorial, Acadia etc), DFO (Heather Bowlby, Mark Simpson), non-profits (Grand Manan Seabird and Whale Research), OTN over the last 2 years. As pointed out by Carl, Heather holds a SARA permit and has an equivalent tagging program for white shark (aka duplication of research effort on a single population of an endangered species). The area that Heather works out of is the outside of St. Margret's Bay or immediately adjacent to Mahone Bay. The main tag type they use is optimized for instantaneous geolocation (excellent opportunities for twitter) but gives no information on habitat use – as needed for SARA research questions.

Canadian scientists will **not** have access to the research data. [REDACTED]

Based on this information, I cannot recommend approval at this time. The amended approval form is attached.

Although I did not change the response in the form, I have no record of a previous approval for this organization.

Outside of my purview, but I understand that the SARA permit requires a DFO observer during at least part of their trip. How will that condition be fulfilled?

[REDACTED]

Alain

**From:** MacDonald, Carl

**Sent:** May 23, 2018 10:32 AM

**To:** Licence Maritimes / Permis Maritimes (DFO/MPO) <RegionalLicensing.XMAR@dfo-mpo.gc.ca>; Vézina, Alain <Alain.Vezina@dfo-mpo.gc.ca>; Herbert, Glen <Glen.Herbert@dfo-mpo.gc.ca>; Pye, Brad <Brad.Pye@dfo-mpo.gc.ca>  
**Cc:** Daley, Annette <Annette.Daley@dfo-mpo.gc.ca>; Berthier, Jacinta <Jacinta.Berthier@dfo-mpo.gc.ca>  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Questions/Comments Regarding Proposed Research:

- Would it be possible for the researcher to describe the bait type they propose to use? le Will the researcher be using Marine Mammal parts for Bait? If so, where will this Marine Mammal bait be acquired?
- Would it be possible for the researcher to be more specific regarding the shark species intended for this research? Currently the document only indicates Shark Species - including White Shark.
- It is important to note that Canadian shark researcher (Heather Bowlby) has been approved to conducted research on the same species (White Shark) in the same area (Mahone Bay).

Regards,

Carl MacDonald  
Resource Management  
Fisheries & Oceans Canada | Government of Canada  
[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca) | Tel: 902-293-8257 | Fax: 902-426-7967

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**From:** MacDonald, Carl  
**Sent:** 2018-May-22 4:06 PM  
**To:** Licence Maritimes / Permis Maritimes (DFO/MPO); Vézina, Alain; Herbert, Glen; Pye, Brad  
**Cc:** Daley, Annette  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Large Pelagic Comments:

1. *Large pelagic sector.* Pelagic longline fishing takes place along the edge of the Scotian Shelf where the large pelagic fleet conducts operations. Caution must be taken to ensure that the scientific research vessel does not cross previously deployed pelagic longlines which run near the surface for distances of 30 - 40 nm. Damaged gear and identifying marks are to be reported to DFO ([Brad.Pye@dfo-mpo.gc.ca](mailto:Brad.Pye@dfo-mpo.gc.ca)) immediately. Vessel is to continuously broadcast an AIS signal.
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Regards,

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**To:** Vézina, Alain; Herbert, Glen; Pye, Brad; MacDonald, Carl  
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**Importance:** High

Good morning – the response time has been changed to **June 1<sup>st</sup> instead of the original August 1<sup>st</sup> request.**

Please review and provide comments/approval for the attached Foreign Vessel Cruise for Scientific Research (Shark species including White Shark).

I have asked NCR to have the applicant provide us with a Map of the Area to be studied, as the areas are only recorded under section 3 of the application. Placentia Bay, Nfld is listed, but as we do not licence vessels for other waters, I will notify Nfld licensing that this application will be reviewed and no doubt, approved for our waters. If Nfld requests that Placentia Bay be included, we will do that.

Thanks and have a nice day!

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---

**From:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO)  
**Sent:** 2017-November-30 1:14 PM  
**To:** Licence Maritimes / Permis Maritimes (DFO/MPO); Duggan, Charmaine; Kean, Jackie; Bowdring, Tony  
**Cc:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO); Lavigne, Élise; Farr, Connie; Chmiel, Jim; [HlxEcareq1@innav.gc.ca](mailto:HlxEcareq1@innav.gc.ca)  
**Subject:** IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Good afternoon,

Please see attached US Marine Scientific Research (MSR) request for the **OCEARCH, Sep 1 – Oct 31, 2018**. It appears as though the proponent intends to conduct work in both Newfoundland and Maritimes Regions (though primarily in Maritimes).

The vessel intends to call on Halifax, NS, between **Sep 9 – Oct 31, 2018**, for provisioning.

We kindly request all responses by **August 1, 2018**.

Best wishes,

Andrew

## Cleveland, Charlene

---

**From:** Cleveland, Charlene  
**Sent:** 2018-May-25 3:55 PM  
**To:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO)  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31, 2018)  
**Attachments:** FW: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018); RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Hi Andrew – in the meantime, can you proceed with requesting the additional information, for the OCEARCH organization, as per the previous (attached) e-mail.

Regards,

Charlene

---

**From:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO)  
**Sent:** 2018-May-25 3:33 PM  
**To:** Cleveland, Charlene  
**Cc:** Farr, Connie; Docherty, Verna; NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO)  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31, 2018)

Hi Charlene,

Thank you for the notification. No reply has been sent to Global Affairs as of yet.

We will standby awaiting further information.

Best,

Andrew

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**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31, 2018)  
**Importance:** High

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Please advise asap.

Thank you

Charlene Cleveland  
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**From:** Cleveland, Charlene  
**Sent:** 2018-May-24 1:27 PM  
**To:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO); Brammer, Andrew  
**Cc:** Farr, Connie; Docherty, Verna  
**Subject:** FW: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018) - Not Approved

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**Sent:** 2018-May-23 1:37 PM  
**To:** MacDonald, Carl; Licence Maritimes / Permis Maritimes (DFO/MPO); Herbert, Glen; Pye, Brad  
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[REDACTED]

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**Sent:** May 23, 2018 10:32 AM

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**Cc:** Daley, Annette <Annette.Daley@dfo-mpo.gc.ca>; Berthier, Jacinta <Jacinta.Berthier@dfo-mpo.gc.ca>

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Regards,

Carl MacDonald

Resource Management

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[Licence.maritimes.permis@dfo-mpo.gc.ca](mailto:Licence.maritimes.permis@dfo-mpo.gc.ca)

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**To:** Licence Maritimes / Permis Maritimes (DFO/MPO); Duggan, Charmaine; Kean, Jackie; Bowdring, Tony

**Cc:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO); Lavigne, Élise; Farr, Connie; Chmiel, Jim;  
[HlxEcareg1@innav.gc.ca](mailto:HlxEcareg1@innav.gc.ca)

**Subject:** IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Good afternoon,

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The vessel intends to call on Halifax, NS, between **Sep 9 – Oct 31, 2018**, for provisioning.

We kindly request all responses by **August 1, 2018**.

Best wishes,

Andrew

**MacLellan, Elizabeth**

---

**From:** Daley, Annette  
**Sent:** Friday, May 25, 2018 5:09 PM  
**To:** Docherty, Verna  
**Subject:** FW: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018) - Not Approved  
**Attachments:** 2 Permit-DFO Bowlby\_2017 final (scanned).pdf; DFO-MAR-2017-17 SARA Permit\_OCEARCH-Signed.pdf; scanned permit DFO-NLSAR-001-18.pdf

*Annette*

**From:** King, Rhea L  
**Sent:** Friday, May 25, 2018 4:06 PM  
**To:** Daley, Annette <Annette.Daley@dfo-mpo.gc.ca>; Vézina, Alain <Alain.Vezina@dfo-mpo.gc.ca>  
**Subject:** FW: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018) - Not Approved

FYI

**From:** Humphrey, Donald  
**Sent:** Friday, May 25, 2018 3:52 PM  
**To:** King, Rhea L <Rhea.King@dfo-mpo.gc.ca>  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018) - Not Approved

Yes. DFO researcher Heather Bowlby has a permit to operate in Atlantic waters within our region and OCEARCH was recently provided with permits from our region and NL to operation in waters in both regions. Permits are attached.

Donald

---

**From:** King, Rhea L  
**Sent:** May-25-18 12:40 PM  
**To:** Humphrey, Donald  
**Subject:** Fw: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018) - Not Approved

Can you pls confirm that 2 different SARA permits have been issued to different proponents for shark tagging in the same area?

Rhea

---

**From:** Daley, Annette <Annette.Daley@dfo-mpo.gc.ca>  
**Sent:** Thursday, May 24, 2018 6:19 PM  
**To:** King, Rhea L  
**Cc:** Berthier, Jacinta  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018) - Not Approved

Yes we can discuss.



*Annette*

**From:** King, Rhea L  
**Sent:** Thursday, May 24, 2018 3:16 PM  
**To:** Daley, Annette <[Annette.Daley@dfo-mpo.gc.ca](mailto:Annette.Daley@dfo-mpo.gc.ca)>  
**Cc:** Berthier, Jacinta <[Jacinta.Berthier@dfo-mpo.gc.ca](mailto:Jacinta.Berthier@dfo-mpo.gc.ca)>  
**Subject:** FW: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018) - Not Approved  
**Importance:** High

Hi Annette,

Can we please discuss this before a decision is communicated externally?

Thanks,  
Rhea

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**From:** Herbert, Glen  
**Sent:** May-24-18 2:54 PM  
**To:** Humphrey, Donald; King, Rhea L; MacDonald, Jennifer  
**Subject:** FW: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018) - Not Approved

See decision below re: rejection of Ocearch research survey.

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Glen Herbert  
Regional Manager  
Oceans and Coastal Management Division  
Ecosystem Management Branch  
Fisheries and Oceans Canada – Maritimes Region  
Bedford Institute of Oceanography  
1 Challenger Dr., PO Box 1006  
5th Floor, Polaris Bldg.  
Dartmouth, NS, B2Y 4A2  
Tel: (902) 802 7051  
Email: [glen.herbert@dfo-mpo.gc.ca](mailto:glen.herbert@dfo-mpo.gc.ca)

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**From:** Cleveland, Charlene  
**Sent:** May-24-18 1:38 PM  
**To:** Vézina, Alain; Herbert, Glen; Pye, Brad; MacDonald, Carl  
**Cc:** Daley, Annette  
**Subject:** FW: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018) - Not Approved

Good afternoon – this cruise will not be approved, due to concerns from Science and Resource Management – see e-mails below.

Regards,

Charlene Cleveland  
Licensing Officer  
Maritimes Region – Dartmouth  
Phone: 902-426-1929  
[Charlene.cleveland@dfo-mpo.gc.ca](mailto:Charlene.cleveland@dfo-mpo.gc.ca)

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**From:** Cleveland, Charlene  
**Sent:** 2018–May-24 1:27 PM  
**To:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO); Brammer, Andrew  
**Cc:** Farr, Connie; Docherty, Verna  
**Subject:** FW: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018) - Not Approved

Good afternoon – please see the e-mail below from Alain Vezina, Regional Director of Science, Maritimes Region. The Oearch cruise is not approved and we will not be issuing a licence.

Please forward our response to the agency that submitted the application.

Regards,

Charlene Cleveland  
Regional Officer, Licensing Services  
Dept of Fisheries & Oceans  
Dartmouth, Nova Scotia  
Tel: (902) 426-9966  
Fax: (902) 426-5010  
[Licence.maritimes.permis@dfo-mpo.gc.ca](mailto:Licence.maritimes.permis@dfo-mpo.gc.ca)

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**From:** Vézina, Alain  
**Sent:** 2018–May-23 1:37 PM  
**To:** MacDonald, Carl; Licence Maritimes / Permis Maritimes (DFO/MPO); Herbert, Glen; Pye, Brad  
**Cc:** Daley, Annette; Berthier, Jacinta  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018) - Not Approved

With respect to the questions on the science section of the approval form:

This research activity will **not** contribute to the Canadian scientific community. Canadian collaborators do not see the benefit of working with Oearch, even though they have contacted all major Atlantic Universities (Dal, Memorial, Acadia etc), DFO (Heather Bowlby, Mark Simpson), non-profits (Grand Manan Seabird and Whale Research), OTN over the last 2 years. As pointed out by Carl, Heather holds a SARA permit and has an equivalent tagging program for white shark (aka duplication of research effort on a single population of an endangered species). The area that Heather works out of is the outside of St. Margret's Bay or immediately adjacent to Mahone Bay. The main tag type they use is optimized for instantaneous geolocation (excellent opportunities for twitter) but gives no information on habitat use – as needed for SARA research questions.

Canadian scientists will **not** have access to the research data. [REDACTED]

[REDACTED]

Based on this information, I cannot recommend approval at this time. The amended approval form is attached.

Although I did not change the response in the form, I have no record of a previous approval for this organization.

Outside of my purview, but I understand that the SARA permit requires a DFO observer during at least part of their trip. How will that condition be fulfilled?

Alain

**From:** MacDonald, Carl

**Sent:** May 23, 2018 10:32 AM

**To:** Licence Maritimes / Permis Maritimes (DFO/MPO) <RegionalLicensing.XMAR@dfo-mpo.gc.ca>; Vézina, Alain <Alain.Vezina@dfo-mpo.gc.ca>; Herbert, Glen <Glen.Herbert@dfo-mpo.gc.ca>; Pye, Brad <Brad.Pye@dfo-mpo.gc.ca>

**Cc:** Daley, Annette <Annette.Daley@dfo-mpo.gc.ca>; Berthier, Jacinta <Jacinta.Berthier@dfo-mpo.gc.ca>

**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Questions/Comments Regarding Proposed Research:

- Would it be possible for the researcher to describe the bait type they propose to use? ie Will the researcher be using Marine Mammal parts for Bait? If so, where will this Marine Mammal bait be acquired?
- Would it be possible for the researcher to be more specific regarding the shark species intended for this research? Currently the document only indicates Shark Species - including White Shark.
- It is important to note that Canadian shark researcher (Heather Bowlby) has been approved to conducted research on the same species (White Shark) in the same area (Mahone Bay).

Regards,

Carl MacDonald

Resource Management

Fisheries & Oceans Canada | Government of Canada

Carl.MacDonald@dfo-mpo.gc.ca | Tel: 902-293-8257 | Fax: 902-426-7967

Regional agent principal de gestion des peches, Gestion des ressources

Pêches et Océans Canada | Gouvernement du Canada

Carl.MacDonald@dfo-mpo.gc.ca | Tél: 902-293-8257 | Télécopieur: 902-426-7967

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**From:** MacDonald, Carl

**Sent:** 2018-May-22 4:06 PM

**To:** Licence Maritimes / Permis Maritimes (DFO/MPO); Vézina, Alain; Herbert, Glen; Pye, Brad

**Cc:** Daley, Annette

**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Large Pelagic Comments:

1. *Large pelagic sector.* Pelagic longline fishing takes place along the edge of the Scotian Shelf where the large pelagic fleet conducts operations. Caution must be taken to ensure that the scientific research vessel does not cross previously deployed pelagic longlines which run near the surface for distances of 30 - 40 nm. Damaged gear and identifying marks are to be reported to DFO ([Brad.Pye@dfo-mpo.gc.ca](mailto:Brad.Pye@dfo-mpo.gc.ca)) immediately. Vessel is to continuously broadcast an AIS signal.
  - Swordfish longline gear may be in other areas.
  - Pelagic Longline Gear have AIS beacons attached.

- Beacons from a licence holder have the same vessel prefix on each beacon ( [REDACTED] )
- There will be a string of beacons on a line. It is not possible to travel between the beacons with the research vessel.
- It is possible to travel a suitable distance alongside a pelagic longline set.

Regards,

Carl MacDonald  
Resource Management  
Fisheries & Oceans Canada | Government of Canada  
[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca) | Tel: 902-293-8257 | Fax: 902-426-7967

Regional agent principal de gestion des peches, Gestion des ressources  
Pêches et Océans Canada | Gouvernement du Canada  
[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca) | Tél: 902-293-8257 | Télécopieur: 902-426-7967

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**From:** Licence Maritimes / Permis Maritimes (DFO/MPO)  
**Sent:** 2018-May-18 10:24 AM  
**To:** Vézina, Alain; Herbert, Glen; Pye, Brad; MacDonald, Carl  
**Cc:** Daley, Annette  
**Subject:** FW: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)  
**Importance:** High

Good morning – the response time has been changed to **June 1<sup>st</sup>** instead of the original August 1<sup>st</sup> request.

Please review and provide comments/approval for the attached Foreign Vessel Cruise for Scientific Research (Shark species including White Shark).

I have asked NCR to have the applicant provide us with a Map of the Area to be studied, as the areas are only recorded under section 3 of the application. Placentia Bay, Nfld is listed, but as we do not licence vessels for other waters, I will notify Nfld licensing that this application will be reviewed and no doubt, approved for our waters. If Nfld requests that Placentia Bay be included, we will do that.

Thanks and have a nice day!

Charlene Cleveland  
Regional Officer, Licensing Services  
Dept of Fisheries & Oceans  
Dartmouth, Nova Scotia  
Tel: (902) 426-9966  
Fax: (902) 426-5010  
[Licence.maritimes.permis@dfo-mpo.gc.ca](mailto:Licence.maritimes.permis@dfo-mpo.gc.ca)

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**From:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO)  
**Sent:** 2017-November-30 1:14 PM  
**To:** Licence Maritimes / Permis Maritimes (DFO/MPO); Duggan, Charmaine; Kean, Jackie; Bowdring, Tony  
**Cc:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO); Lavigne, Élise; Farr, Connie; Chmiel, Jim;

[HlxEcareg1@innav.gc.ca](mailto:HlxEcareg1@innav.gc.ca)

**Subject:** IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Good afternoon,

Please see attached US Marine Scientific Research (MSR) request for the **OCEARCH, Sep 1 – Oct 31, 2018**. It appears as though the proponent intends to conduct work in both Newfoundland and Maritimes Regions (though primarily in Maritimes).

The vessel intends to call on Halifax, NS, between **Sep 9 – Oct 31, 2018**, for provisioning.

We kindly request all responses by **August 1, 2018**.

Best wishes,

Andrew



## PERMIT ISSUED UNDER SECTION 73 OF THE *SPECIES AT RISK ACT*

Subject to the conditions described in this permit, the holder of this permit ("Permit Holder"), or any qualified person acting under the authority of the Permit Holder, is authorized under the authority of subsection 73(1) of the *Species at Risk Act*, S.C. 2002, c.29 (SARA) to engage in activities (as described in this permit) that **harass and harm** individuals for the following threatened or endangered aquatic species listed on Schedule 1 of SARA:

**White Shark** (*Carcharodon carcharias*), Atlantic population

### Permit issued to:

Name: Fisheries and Oceans Canada  
Attention: Dr. Heather Bowlby  
Email: [Heather.Bowlby@dfo-mpo.gc.ca](mailto:Heather.Bowlby@dfo-mpo.gc.ca)  
Address: Fisheries and Oceans Canada  
Bedford Institute of Oceanography  
1 Challenger Drive Dartmouth, Nova Scotia B2Y 4A2  
Phone: 902-426-5836 (office)

The following individual operating under the authority of Fisheries and Oceans Canada (DFO) as "Permit Holder", and those under her supervision, may undertake the activities authorized by this permit:

Name	Organization
Heather Bowlby	DFO
Warren Joyce	DFO

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### Location of Proposed Activity

**This permit is only valid at the following location(s):**

Nearest community: N/A  
Municipality, district, township, county: N/A  
Province: N/A  
Name of waterbody: **Atlantic Ocean**  
Specific location: **DFO Maritimes Region**

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### Valid Permit Period

This permit is valid from **JUN 30 2017** until **December 31, 2021**

If the Permit Holder cannot complete the activity during this period, DFO must be notified in advance of the expiration of the time period, as soon as the Permit Holder is aware.

The period during which other conditions of this permit must be complied with are provided in their respective sections below. DFO may, where appropriate, amend this permit. In cases where the Valid Permit Period is extended, written notice and/or an amended permit will be provided to the Permit Holder.

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**Description of the Activity**

The purpose of the activity is to attach Pop-up Archival Satellite Tags (PSAT) on up to seven White Sharks. The data is being gathered to gain a better understand White Shark habitat use in Canadian waters.

When there are reports of White Shark sightings, researchers will place chum (bait consisting of fish parts, bone and blood) in the water to attract the shark. If a White Shark is sighted, a fish attached to a line will be placed in the water and trailed beside the vessel in an attempt to lure the shark alongside the vessel and into the position needed for tagging. Using a long pole with a stainless steel tagging needle, the PSAT will be inserted into the musculature immediately posterior to the first dorsal fin of the shark. The data logger and leader portion of the tag will eventually detach from the shark, but the anchor barb will stay attached to the shark indefinitely.

The activities authorized by this permit consist of:

- Actively attracting White Sharks to a vessel, and
- Attaching PSAT tags to White Sharks by inserting a steel anchor into the base of the first dorsal fin using a pole.

The effects that the activities may cause to the listed wildlife species and the effects of those changes authorized by this permit are as follows:

- Harassment and harm to individuals.

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**Terms and Conditions of Permit**

The activity must be carried on in accordance with the following conditions:

**1. General Conditions**

- 1.1. A copy of this permit shall be kept on site at all times in the possession of the Permit Holder or a person acting under the Permit Holder's authority, and shall be made available to an enforcement officer upon request.
- 1.2. All persons undertaking the activity under the authority of the Permit Holder shall be made familiar with the conditions of this permit.
- 1.3. The activities must comply with the conditions identified within this permit. Activities that affect individuals of species at risk, their residences, or their critical habitat, other than those specifically identified within this permit are not authorized under this permit.
- 1.4. No changes to the Permitted activities shall take place without prior consultation with DFO, and written approval from DFO, Species at Risk Management Division. Contact information as follows:

**Species at Risk Management Division**  
**Fisheries and Oceans Canada**  
**P.O. Box 1006**  
**Dartmouth, NS, B2Y 4A2**  
**email: [SpeciesatRisk.xmar@dfo-mpo.gc.ca](mailto:SpeciesatRisk.xmar@dfo-mpo.gc.ca)**  
**phone: 1-866-891-0771 fax: 1-902-426-2331**

**2. Conditions to avoid or minimize the impact of the activity on the species:**

- 2.1. White Sharks shall remain in the water at all times.
- 2.2. White Sharks shall not be chased by the vessel.
- 2.3. No attempts shall be made to capture White Sharks.
- 2.4. Only individuals that are experienced in tagging large pelagic fishes shall tag White Sharks.

- 2.5. Only one tagging attempt shall be made per individual White Shark.
- 2.6. No attempts shall be made to tag White Sharks that are injured or behaving abnormally.
- 2.7. No more than seven White Sharks, in total, shall be tagged.
- 2.8. Any equipment that will puncture the skin of a White Shark during tagging shall be sterilized before use.

**3. Conditions that relate to monitoring and reporting:**

- 3.1. By January 31st following each year that this Permit is valid, irrespective of whether the Permitted activities took place, a SARA Section 73 Permit Report shall be completed for the previous calendar year's activities, and returned to the Species at Risk Management Division using the contact information provided in condition 1.4.
- 3.2. The SARA Section 73 Permit Report shall contain the following information, to the satisfaction of DFO in its sole discretion:
  - 3.2.1. For any interaction with, or sighting of, a White Shark, report the following: date, time, location, condition of the individual; and identify if tagging was attempted or undertaken on that individual.
  - 3.2.2. Provide details of any tagging attempts (e.g., position of shark in relation to the vessel, whether tagging was successful, unplanned/unexpected impacts on the shark, reaction of the shark to the tagging, lessons learned).
  - 3.2.3. Report details of any contingency measures that were followed to prevent impacts greater than those authorized by this permit.



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### Authorization Limitations and Application Conditions

This permit cannot be transferred or assigned to another party. If the activity authorized under this permit is sold or transferred to another party, or if other circumstances arise that result in another party taking over the activity, the Permit Holder shall advise DFO in advance if the ownership or responsibility for the activity is expected to change.

The failure to comply with any condition of this permit is an offence under section 97 of SARA and might result in charges being laid under SARA.

This permit may be revoked or amended to ensure the survival or recovery of the White Shark. Without limiting the generality of the foregoing, DFO may:

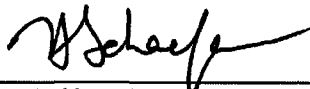
- Suspend any permitted activities to avoid or mitigate additional adverse direct or indirect effects to White Sharks;
- Amend or revoke this permit; and
- Direct the Permit Holder to carry out at the Permit Holder's expense any modifications or actions deemed necessary by DFO to avoid or mitigate existing impacts or to avoid further adverse direct and indirect impacts to the White Sharks.

This permit is valid only with the activities and species listed herein and for no other purposes. This permit does not purport to release the Permit Holder from any obligation to obtain permission from, or to comply with, any other regulatory requirements.

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Date of Issue: JUN 30 2017

Signature of authorizing officer:

  
for

Donald Humphrey  
A/Manager, Species at Risk Management Division  
Maritimes Region  
Fisheries and Oceans Canada  
1 Challenger Drive, P.O. Box 1006, Dartmouth, NS, B2Y 4A2

Further information about this permit is available from Donald Humphrey, A/Regional Manager, Species at Risk Management Division, email: [SpeciesatRisk.xmar@dfo-mpo.gc.ca](mailto:SpeciesatRisk.xmar@dfo-mpo.gc.ca), phone: 1-866-891-0771, or fax: 902-426-2331.



Fisheries and Oceans Pêches et Océans  
Canada Canada

SARA Permit No: DFO-MAR-2017-17

## PERMIT ISSUED UNDER SECTION 73 OF THE *SPECIES AT RISK ACT*

Subject to the conditions described in this permit, the holder of this permit ("Permit Holder"), or any qualified person acting under the authority of the Permit Holder, is authorized under the authority of subsection 73(1) of the *Species at Risk Act*, S.C. 2002, c.29 (SARA) to engage in activities (as described in this permit) that **harm, harass, capture, and possess** individuals of the following threatened or endangered aquatic species listed on Schedule 1 of SARA:

**White Shark** (*Carcharodon carcharias*), Atlantic population

### Permit issued to:

Name: OCEARCH ("Permit Holder"):  
Attention to: George Christopher Fischer  
Address: 1790 Bonanza Drive, Suite 101B  
Park City, Utah, USA 84060  
Email: [chris@oceanarch.org](mailto:chris@oceanarch.org)  
Phone: (435) 645-8990 (office) [redacted] (cellular)

The following individual operating under the authority of Fisheries and Oceans Canada (DFO) as "Permit Holder", and those under his supervision, may undertake the activities authorized by this permit:

Name	Organization
Robert Hueter	Mote Marine Laboratory

### Location of Proposed Activity

**This permit is only valid at the following location(s):**

Nearest community (city, town, village): N/A

Municipality, district, township, county: N/A

Province: N/A

Name of watercourse(s), waterbody(ies): **Atlantic Ocean**

Specific location: Mahone Bay, Bay of Fundy and the area around Sable Island

### Valid Permit Period

This permit is valid from **August 1, 2018** until **November 30, 2018**

If the Permit Holder cannot complete the activity during this period, Fisheries and Oceans Canada (DFO) must be notified in advance of the expiration of the time period, as soon as the Permit Holder is aware.

The period during which other conditions of this permit must be complied with are provided in their respective sections below. DFO may, where appropriate, amend this permit. In cases where the Valid Permit Period is extended, written notice and/or an amended permit will be provided to the Permit Holder.

Canada

.../2

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### Description of the Activity

The purpose of the activity is to conduct scientific research on White Sharks in Canadian waters to gain a better understanding of the role of Canadian waters in the life history of the White Shark population in the northwest Atlantic Ocean, the range of the species within Canadian waters and health of White Sharks. The researchers will attach acoustic and satellite tags, as well as collect various biological samples, from up to 20 sharks in Canadian waters.

The study area includes:

- Mahone Bay;
- Bay of Fundy; and
- Scotian Shelf.

Researchers will use chum to attract White Sharks in the study area to the fishing boat and larger research vessel. When a White Shark is sighted, either visually or using a drone, the fishing boat will target its fishing activities to attract and capture that shark. Chum bags, chum boxes, bait tanks, chum tubes and decoys may all be used to attract White Sharks to the fishing vessel. Once a White Shark is in the vicinity of the fishing vessel, the researchers will attempt to catch the shark using a 20/0 circle hook (zero offset) with a bite-blocker attached. In the case of a very large White Shark, a 27/0 circle hook (zero offset) with a buoy to prevent swallowing of the hook will be used. Once caught, the White Shark will be guided onboard the hydraulic lift on the research vessel, which will then be raised above the waterline. While on the lift, sharks will be provided with oxygenated seawater via a mouthpiece and tube.

Once on the lift, internal acoustic tags will be implanted surgically in the coelomic cavity and the incision will be sutured. Smart Position and Temperature (SPOT) tags will be attached on the leading edge of the first dorsal fin by drilling four holes in the dorsal fin with an electric drill and attaching the tag with nylon bolts, stainless steel locknuts and plastic spacers. The hardware is designed to retain the tag for five years after which it will fail and the tag will detach. All White Sharks caught, up to 20, will have both acoustic and SPOT tags applied. Pop-up Archival Satellite Tags (PSAT) will be attached via a tether to a subdermal metal dart implanted in the shark's flank below the first dorsal fin. PSAT tags will be attached to up to 6 White Sharks caught.

The researchers will also collect samples (blood, muscle, semen, fecal and urine samples), conduct skin, gill and cloacal swabs, collect parasites, collect eye and tail measurements, and perform an ultrasound (females). Samples will be collected using a hypodermic puncture and biopsy punch.

The activities authorized by this permit consist of:

- Actively attracting White Sharks to a vessel;
- Catch and release of White Sharks;
- Lifting individuals out of the water on a hydraulic lift;
- Collecting blood and tissue samples;
- Implanting internal acoustic tags; and
- Attaching SPOT and PSAT tags.

The effects that the activity may cause to the listed wildlife species and the effects of those changes authorized by this permit are as follows:

- Harm, harassment, capture and possession of listed aquatic species at risk.

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## Terms and Conditions of Permit

The activity must be carried on in accordance with the following conditions:

### 1. General Conditions

- 1.1. A copy of this permit shall be kept on site at all times in the possession of the Permit Holder or a person acting under the Permit Holder's authority, and shall be made available to an enforcement officer upon request.
- 1.2. All persons undertaking the activity under the authority of the Permit Holder shall do so under the direction and oversight of the Permit Holder and shall be made familiar with the conditions of this permit.
- 1.3. The activity must comply with the conditions identified within this permit. Activities that affect individuals of species at risk, their residences, or their critical habitat, other than those specifically identified within this permit are not authorized under this permit.
- 1.4. No changes to the Permitted activities shall take place without prior consultation with DFO, and written approval from DFO, Species at Risk Management Division. Contact information as follows:

**Species at Risk Management Division**  
**Fisheries and Oceans Canada**  
**P.O. Box 1006**  
**Dartmouth, NS, B2Y 4A2**  
**email: [SpeciesatRisk.xmar@dfo-mpo.gc.ca](mailto:SpeciesatRisk.xmar@dfo-mpo.gc.ca)**  
**phone: 1-866-891-0771 fax: 1-902-426-2331**

### 2. Conditions to avoid or minimize the impact of the activity on the species:

- 2.1. To the extent possible, activities shall be conducted in a manner whereby any individuals of the species shall be handled only in the circumstances authorized under this permit and with the least amount of harm.
- 2.2. Activities shall only be conducted in the study area described above. If activities are to be conducted outside the study area, DFO shall be notified in advance using the contact information in condition 1.4.
- 2.3. Only individuals that are experienced in tagging large pelagic fishes shall tag White Sharks.
- 2.4. White Sharks shall not be chased by the vessel.
- 2.5. The following gear shall be used: circle hooks (either 20/0 or 27/0 with zero offset) rigged with a cross bar bit-blocker (30cm up the leader) and attached to a stainless steel wire rope (3/32" or 1/8"). The leader shall be 10m in length and shall be attached to a braid rope with elasticity properties. Leaders shall be embedded inside a three-strand rope to increase the diameter.
- 2.6. Individual White Sharks shall not be kept on the research platform for longer than 20 minutes.
- 2.7. While on the research platform, oxygenated seawater shall be pumped through a hose and mouthpiece into the shark's buccal cavity at all times.
- 2.8. While on the research platform, a tail rope shall be used to prevent the animal from causing harm to itself and others.
- 2.9. While on the research platform, the animal's head and eyes shall be covered with wet towel to reduce animal stress and keep eyes moist.
- 2.10. While on the research platform, the animal's skin shall be kept wet.
- 2.11. While on the research platform animal stress shall be monitored by observing skin colouration, presence of blood pooling, gill movements, and animal activity. If acute stress is observed, the animal shall be released immediately.
- 2.12. The total time of engagement with a single White Shark from the time it is initially hooked until it is released shall be limited to 40 minutes.
- 2.13. No more than 20 White Sharks, in total, shall be tagged.
- 2.14. No attempts shall be made to tag White Sharks that are injured or behaving abnormally.
- 2.15. Only White Sharks greater than 3.5 metres in total length shall be caught and tagged.
- 2.16. A DFO representative shall be onboard as an observer during a subset of the expedition to be

determined by DFO.

- 2.17. In the event of a mortality or significant injury being sustained by a White Shark during a tagging attempt, all further attempts at tagging shall cease and DFO shall be contacted immediately using the contact information in condition 1.4. No further attempts at catching or tagging White Sharks shall be resumed until approved by DFO.

**3. Conditions that relate to monitoring and reporting:**

- 3.1. By December 31st, 2018, irrespective of whether the Permitted activities took place, a SARA Section 73 Permit Report shall be completed and returned to the Species at Risk Management Division using the contact information provided in condition 1.4. Without limiting the generality of the foregoing, the report shall contain the following information, to the satisfaction of DFO in its sole discretion:
- 3.1.1. to demonstrate that measures and standards to avoid and mitigate the impacts of the permitted activities on the species were implemented according to the conditions of this permit;
  - 3.1.2. an assessment of whether the measures and standards mentioned in condition 3.1.1 were successful at avoiding and mitigating the impacts of the permitted activities on the species;
  - 3.1.3. details of any contingency measures that were followed to prevent impacts greater than those authorized by this permit;
  - 3.1.4. for any interaction with, or sighting of, a White Shark, report the following: date, time, location, length, size, gender (specify if females are pregnant or not), condition of the individual; and identify if tagging was attempted or undertaken on that individual; and
  - 3.1.5. provide details of any tagging attempts, including whether tagging was successful, unplanned or unexpected impacts on the shark, reaction of the shark to the tagging, and lessons learned.

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**Authorization Limitations and Application Conditions**

This permit cannot be transferred or assigned to another party. If the activity authorized under this permit is sold or transferred to another party, or if other circumstances arise that result in another party taking over the activity, the Permit Holder shall advise DFO in advance if the ownership or responsibility for the activity is expected to change.

The failure to comply with any condition of this permit is an offence under section 97 of SARA and might result in charges being laid under SARA.

This permit may be revoked or amended to ensure the survival or recovery of White Shark. Without limiting the generality of the foregoing, DFO may:

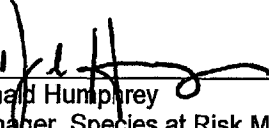
- suspend any permitted activities to avoid or mitigate additional adverse direct or indirect effects to White Sharks;
- amend or revoke this permit; and
- direct the Permit Holder to carry out at the Permit Holder's expense any modifications or actions deemed necessary by DFO to avoid or mitigate existing impacts or to avoid further adverse direct and indirect impacts to White Sharks.

This permit is valid only with activities and species listed herein and for no other purposes. It does not authorize the Permit Holder to kill, buy, sell, or trade an individual of a wildlife species that is listed as extirpated, endangered or threatened, or any part or derivative of such an individual. This permit does not purport to release the Permit Holder from any obligation to obtain permission from or to comply with the requirements of any other regulatory agencies.

---

Date of Issue: **APR 30 2018**

Signature of authorizing officer:

  
Donald Humphrey  
Manager, Species at Risk Management Division  
Maritimes Region  
Fisheries and Oceans Canada  
1 Challenger Drive, P.O. Box 1006, Dartmouth, NS, B2Y 4A2

Further information about this permit is available from the above authorizing officer ([Donald.Humphrey@dfo-mpo.gc.ca](mailto:Donald.Humphrey@dfo-mpo.gc.ca)).

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## PERMIT ISSUED UNDER SECTION 73 OF THE *SPECIES AT RISK ACT*

Subject to the conditions described in this permit, the holder of this permit ("Permit Holder"), or any qualified person acting under the authority of the Permit Holder, is authorized under the authority of subsection 73(1) of the *Species at Risk Act*, S.C. 2002, c.29 (SARA) to engage in activities (as described in this permit) that **harm, harass, capture, and possess** individuals of the following threatened or endangered aquatic species listed on Schedule 1 of SARA:

**White Shark** (*Carcharodon carcharias*), Atlantic population

### Permit issued to:

Name: OCEARCH ("Permit Holder");  
Attention to: George Christopher Fischer  
Address: 1790 Bonanza Drive, Suite 101B  
Park City, Utah, USA 84060  
Email: [chris@oceanarch.org](mailto:chris@oceanarch.org)  
Phone: (435) 645-8990 (office) ( ) (cellular)

The following individual operating under the authority of Fisheries and Oceans Canada (DFO) as "Permit Holder", and those under his supervision, may undertake the activities authorized by this permit:

Name	Organization
Robert Hueter	Mote Marine Laboratory

### Location of Proposed Activity

**This permit is only valid at the following location(s):**

Nearest community (city, town, village): N/A

Municipality, district, township, county: N/A

Province: N/A

Name of watercourse(s), waterbody(ies): **Atlantic Ocean**

Specific location: South coast of Newfoundland including: Placentia Bay (47° 05.00' N / 54° 32.00' W)

### Valid Permit Period

This permit is valid from 2018-08-01 until 2018-11-30.

If the Permit Holder cannot complete the activity during this period, Fisheries and Oceans Canada (DFO) must be notified in advance of the expiration of the time period, as soon as the Permit Holder is aware.

The period during which other conditions of this permit must be complied with are provided in their respective sections below. DFO may, where appropriate, amend this permit. In cases where the Valid Permit Period is extended, written notice and/or an amended permit will be provided to the Permit Holder.

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### Description of the Activity

The purpose of the activity is to conduct scientific research on White Sharks in Canadian waters to gain a better understanding of the role of Canadian waters in the life history of the White Shark population in the northwest Atlantic Ocean, the range of the species within Canadian waters and health of White Sharks. The researchers will attach acoustic and satellite tags, as well as collect various biological samples, from up to 20 sharks in Canadian waters.

The study area includes:

- South coast of Newfoundland including Placentia Bay (47° 05.00' N / 54° 32.00' W)

Researchers will use chum to attract White Sharks in the study area to the fishing boat and larger research vessel. When a White Shark is sighted, either visually or using a drone, the fishing boat will target its fishing activities to attract and capture that shark. Chum bags, chum boxes, bait tanks, chum tubes and decoys may all be used to attract White Sharks to the fishing vessel. Once a White Shark is in the vicinity of the fishing vessel, the researchers will attempt to catch the shark using a 20/0 circle hook (zero offset) with a bite-blocker attached. In the case of a very large White Shark, a 27/0 circle hook (zero offset) with a buoy to prevent swallowing of the hook will be used. Once caught, the White Shark will be guided onboard the hydraulic lift on the research vessel, which will then be raised above the waterline. While on the lift, sharks will be provided with oxygenated seawater via a mouthpiece and tube.

Once on the lift, internal acoustic tags will be implanted surgically in the coelomic cavity and the incision will be sutured. Smart Position and Temperature (SPOT) tags will be attached on the leading edge of the first dorsal fin by drilling four holes in the dorsal fin with an electric drill and attaching the tag with nylon bolts, stainless steel locknuts and plastic spacers. The hardware is designed to retain the tag for five years after which it will fail and the tag will detach. All White Sharks caught, up to 20, will have both acoustic and SPOT tags applied. Pop-up Archival Satellite Tags (PSAT) will be attached via a tether to a subdermal metal dart implanted in the shark's flank below the first dorsal fin. PSAT tags will be attached to up to 6 White Sharks caught.

The researchers will also collect samples (blood, muscle, semen, fecal and urine samples), conduct skin, gill and cloacal swabs, collect parasites, collect eye and tail measurements, and perform an ultrasound (females). Samples will be collected using a hypodermic puncture and biopsy punch.

The activities authorized by this permit consist of:

- Actively attracting White Sharks to a vessel;
- Catch and release of White Sharks;
- Lifting individuals out of the water on a hydraulic lift;
- Collecting blood and tissue samples;
- Implanting internal acoustic tags; and
- Attaching SPOT and PSAT tags.

The effects that the activity may cause to the listed wildlife species and the effects of those changes authorized by this permit are as follows:

- Harm, harassment, capture and possession of listed aquatic species at risk.



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## Terms and Conditions of Permit

The activity must be carried on in accordance with the following conditions:

### 1. General Conditions

- 1.1. A copy of this permit shall be kept on site at all times in the possession of the Permit Holder or a person acting under the Permit Holder's authority, and shall be made available to an enforcement officer upon request.
- 1.2. All persons undertaking the activity under the authority of the Permit Holder shall do so under the direction and oversight of the Permit Holder and shall be made familiar with the conditions of this permit.
- 1.3. The activity must comply with the conditions identified within this permit. Activities that affect individuals of species at risk, their residences, or their critical habitat, other than those specifically identified within this permit are not authorized under this permit.
- 1.4. No changes to the Permitted activities shall take place without prior consultation with DFO, and written approval from DFO, Species at Risk Management Division. Contact information as follows:

**Species at Risk Management Division**  
**Fisheries and Oceans Canada**  
**80 East White Hills Road**  
**PO Box 5667**  
**St. John's, NL, A1C 5X1**  
**email: [SARANL-LEPTNL@dfo-mpo.gc.ca](mailto:SARANL-LEPTNL@dfo-mpo.gc.ca)**  
**phone: 1-709-772-2443 fax: 1-709-772-5562**

### 2. Conditions to avoid or minimize the impact of the activity on the species:

- 2.1. To the extent possible, activities shall be conducted in a manner whereby any individuals of the species shall be handled only in the circumstances authorized under this permit and with the least amount of harm.
  - 2.2. Activities shall only be conducted in the study area described above. If activities are to be conducted outside the study area, DFO shall be notified in advance using the contact information in condition 1.4.
  - 2.3. Only individuals that are experienced in tagging large pelagic fishes shall tag White Sharks.
  - 2.4. White Sharks shall not be chased by the vessel.
  - 2.5. The following gear shall be used: circle hooks (either 20/0 or 27/0 with zero offset) rigged with a cross bar bit-blocker (30cm up the leader) and attached to a stainless steel wire rope (3/32" or 1/8"). The leader shall be 10m in length and shall be attached to a braid rope with elasticity properties. Leaders shall be embedded inside a three-strand rope to increase the diameter.
  - 2.6. Individual White Sharks shall not be kept on the research platform for longer than 20 minutes.
  - 2.7. While on the research platform, oxygenated seawater shall be pumped through a hose and mouthpiece into the shark's buccal cavity at all times.
  - 2.8. While on the research platform, a tail rope shall be used to prevent the animal from causing harm to itself and others.
  - 2.9. While on the research platform, the animal's head and eyes shall be covered with wet towel to reduce animal stress and keep eyes moist.
  - 2.10. While on the research platform, the animal's skin shall be kept wet.
  - 2.11. While on the research platform animal stress shall be monitored by observing skin colouration, presence of blood pooling, gill movements, and animal activity. If acute stress is observed, the animal shall be released immediately.
  - 2.12. The total time of engagement with a single White Shark from the time it is initially hooked until it is released shall be limited to 40 minutes.
  - 2.13. No more than 20 White Sharks, in total, shall be tagged.
  - 2.14. No attempts shall be made to tag White Sharks that are injured or behaving abnormally.
  - 2.15. Only White Sharks greater than 3.5 metres in total length shall be caught and tagged.
-

- 2.16. A DFO representative shall be onboard as an observer during a subset of the expedition to be determined by DFO.
- 2.17. In the event of a mortality or significant injury being sustained by a White Shark during a tagging attempt, all further attempts at tagging shall cease and DFO shall be contacted immediately using the contact information in condition 1.4. No further attempts at catching or tagging White Sharks shall be resumed until approved by DFO.

**3. Conditions that relate to monitoring and reporting:**

- 3.1. By December 31, 2018, irrespective of whether the Permitted activities took place, a SARA Section 73 Permit Report shall be completed and returned to the Species at Risk Management Division using the contact information provided in condition 1.4. Without limiting the generality of the foregoing, the report shall contain the following information, to the satisfaction of DFO in its sole discretion:
  - 3.1.1. to demonstrate that measures and standards to avoid and mitigate the impacts of the permitted activities on the species were implemented according to the conditions of this permit;
  - 3.1.2. an assessment of whether the measures and standards mentioned in condition 3.1.1 were successful at avoiding and mitigating the impacts of the permitted activities on the species;
  - 3.1.3. details of any contingency measures that were followed to prevent impacts greater than those authorized by this permit;
  - 3.1.4. for any interaction with, or sighting of, a White Shark, report the following: date, time, location, length, size, gender (specify if females are pregnant or not), condition of the individual; and identify if tagging was attempted or undertaken on that individual; and
  - 3.1.5. provide details of any tagging attempts, including whether tagging was successful, unplanned or unexpected impacts on the shark, reaction of the shark to the tagging, and lessons learned.

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**Authorization Limitations and Application Conditions**

This permit cannot be transferred or assigned to another party. If the activity authorized under this permit is sold or transferred to another party, or if other circumstances arise that result in another party taking over the activity, the Permit Holder shall advise DFO in advance if the ownership or responsibility for the activity is expected to change.

The failure to comply with any condition of this permit is an offence under section 97 of SARA and might result in charges being laid under SARA.

This permit may be revoked or amended to ensure the survival or recovery of White Shark. Without limiting the generality of the foregoing, DFO may:

- suspend any permitted activities to avoid or mitigate additional adverse direct or indirect effects to White Sharks;
- amend or revoke this permit; and
- direct the Permit Holder to carry out at the Permit Holder's expense any modifications or actions deemed necessary by DFO to avoid or mitigate existing impacts or to avoid further adverse direct and indirect impacts to White Sharks.

This permit is valid only with activities and species listed herein and for no other purposes. It does not authorize the Permit Holder to kill, buy, sell, or trade an individual of a wildlife species that is listed as extirpated, endangered or threatened, or any part or derivative of such an individual. This permit does not purport to release the Permit Holder from any obligation to obtain permission from or to comply with the requirements of any other regulatory agencies.

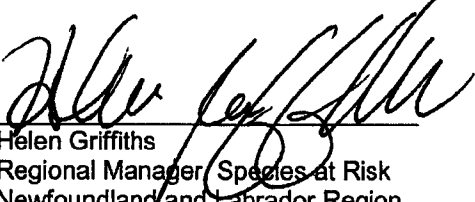
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Date of Issue: 2018-04-30

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Signature of authorizing officer:

  
Helen Griffiths  
Regional Manager, Species at Risk  
Newfoundland and Labrador Region  
Fisheries and Oceans Canada  
80 East White Hills Road, PO Box 5667, St. John's NL A1C 5X1

Further information about this permit is available from the above authorizing officer ([Helen.Griffiths@dfo-mpo.gc.ca](mailto:Helen.Griffiths@dfo-mpo.gc.ca)).

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## MacDonald, Jennifer

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**From:** Herbert, Glen  
**Sent:** May-25-18 6:32 PM  
**To:** King, Rhea L; Humphrey, Donald  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

[REDACTED] Ultimately, it is  
Global Affairs who makes the decision on yes/no and I doubt they would accept our's.  
[REDACTED]

So when the form comes back, I will share it around.

Glen

---

Glen Herbert  
Regional Manager  
Oceans and Coastal Management Division  
Ecosystem Management Branch  
Fisheries and Oceans Canada – Maritimes Region  
Bedford Institute of Oceanography  
1 Challenger Dr., PO Box 1006  
5th Floor, Polaris Bldg.  
Dartmouth, NS, B2Y 4A2  
Tel: (902) 802 7051  
Email: [glen.herbert@dfo-mpo.gc.ca](mailto:glen.herbert@dfo-mpo.gc.ca)

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**From:** Daley, Annette  
**Sent:** May-25-18 4:33 PM  
**To:** Vézina, Alain  
**Cc:** Berthier, Jacinta; Docherty, Verna; MacDonald, Carl; Licence Maritimes / Permis Maritimes (DFO/MPO); Herbert, Glen; Pye, Brad; King, Rhea L; Lambert, Robert  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Alain and Rhea - The recommendation has not gone back to Global Affairs so Ocearch has not been informed. Therefore we will go back around with the review process and perhaps Alain, there is a section in the form to add conditions that would be required to be met under the RDGs signature if we wanted to go that route rather than denying the application. Apparently NL is authorizing some work in Placentia Bay.

*Annette*

**From:** Vézina, Alain  
**Sent:** Wednesday, May 23, 2018 1:37 PM  
**To:** MacDonald, Carl <Carl.MacDonald@dfo-mpo.gc.ca>; Licence Maritimes / Permis Maritimes (DFO/MPO) <RegionalLicensing.XMAR@dfo-mpo.gc.ca>; Herbert, Glen <Glen.Herbert@dfo-mpo.gc.ca>; Pye, Brad <Brad.Pye@dfo-mpo.gc.ca>  
**Cc:** Daley, Annette <Annette.Daley@dfo-mpo.gc.ca>; Berthier, Jacinta <Jacinta.Berthier@dfo-mpo.gc.ca>  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

With respect to the questions on the science section of the approval form:

This research activity will **not** contribute to the Canadian scientific community. Canadian collaborators do not see the benefit of working with Oearch, even though they have contacted all major Atlantic Universities (Dal, Memorial, Acadia etc), DFO (Heather Bowlby, Mark Simpson), non-profits (Grand Manan Seabird and Whale Research), OTN over the last 2 years. As pointed out by Carl, Heather holds a SARA permit and has an equivalent tagging program for white shark (aka duplication of research effort on a single population of an endangered species). The area that Heather works out of is the outside of St. Margret's Bay or immediately adjacent to Mahone Bay. The main tag type they use is optimized for instantaneous geolocation (excellent opportunities for twitter) but gives no information on habitat use – as needed for SARA research questions.

Canadian scientists will **not** have access to the research data. [REDACTED]

Based on this information, I cannot recommend approval at this time. The amended approval form is attached.

Although I did not change the response in the form, I have no record of a previous approval for this organization.

Outside of my purview, but I understand that the SARA permit requires a DFO observer during at least part of their trip. How will that condition be fulfilled?

Alain

**From:** MacDonald, Carl

**Sent:** May 23, 2018 10:32 AM

**To:** Licence Maritimes / Permis Maritimes (DFO/MPO) <[RegionalLicensing.XMAR@dfo-mpo.gc.ca](mailto:RegionalLicensing.XMAR@dfo-mpo.gc.ca)>; Vézina, Alain <[Alain.Vezina@dfo-mpo.gc.ca](mailto:Alain.Vezina@dfo-mpo.gc.ca)>; Herbert, Glen <[Glen.Herbert@dfo-mpo.gc.ca](mailto:Glen.Herbert@dfo-mpo.gc.ca)>; Pye, Brad <[Brad.Pye@dfo-mpo.gc.ca](mailto:Brad.Pye@dfo-mpo.gc.ca)>

**Cc:** Daley, Annette <[Annette.Daley@dfo-mpo.gc.ca](mailto:Annette.Daley@dfo-mpo.gc.ca)>; Berthier, Jacinta <[Jacinta.Berthier@dfo-mpo.gc.ca](mailto:Jacinta.Berthier@dfo-mpo.gc.ca)>

**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Questions/Comments Regarding Proposed Research:

- Would it be possible for the researcher to describe the bait type they propose to use? ie Will the researcher be using Marine Mammal parts for Bait? If so, where will this Marine Mammal bait be acquired?
- Would it be possible for the researcher to be more specific regarding the shark species intended for this research? Currently the document only indicates Shark Species - including White Shark.
- It is important to note that Canadian shark researcher (Heather Bowlby) has been approved to conducted research on the same species (White Shark) in the same area (Mahone Bay). ([REDACTED])

Regards,

Carl MacDonald  
Resource Management  
Fisheries & Oceans Canada | Government of Canada  
[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca) | Tel: 902-293-8257 | Fax: 902-426-7967

Regional agent principal de gestion des peches, Gestion des ressources

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**From:** MacDonald, Carl  
**Sent:** 2018-May-22 4:06 PM  
**To:** Licence Maritimes / Permis Maritimes (DFO/MPO); Vézina, Alain; Herbert, Glen; Pye, Brad  
**Cc:** Daley, Annette  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Large Pelagic Comments:

1. *Large pelagic sector.* Pelagic longline fishing takes place along the edge of the Scotian Shelf where the large pelagic fleet conducts operations. Caution must be taken to ensure that the scientific research vessel does not cross previously deployed pelagic longlines which run near the surface for distances of 30 - 40 nm. Damaged gear and identifying marks are to be reported to DFO ([Brad.Pye@dfo-mpo.gc.ca](mailto:Brad.Pye@dfo-mpo.gc.ca)) immediately. Vessel is to continuously broadcast an AIS signal.
  - Swordfish longline gear may be in other areas.
  - Pelagic Longline Gear have AIS beacons attached.
  - Beacons from a licence holder have the same vessel prefix on each beacon [REDACTED]
  - There will be a string of beacons on a line. It is not possible to travel between the beacons with the research vessel.
  - It is possible to travel a suitable distance alongside a pelagic longline set.

Regards,

Carl MacDonald  
Resource Management  
Fisheries & Oceans Canada | Government of Canada  
[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca) | Tel: 902-293-8257 | Fax: 902-426-7967

Regional agent principal de gestion des peches, Gestion des ressources  
Pêches et Océans Canada | Gouvernement du Canada  
[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca) | Tél: 902-293-8257 | Télécopieur: 902-426-7967

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**From:** Licence Maritimes / Permis Maritimes (DFO/MPO)  
**Sent:** 2018-May-18 10:24 AM  
**To:** Vézina, Alain; Herbert, Glen; Pye, Brad; MacDonald, Carl  
**Cc:** Daley, Annette  
**Subject:** FW: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)  
**Importance:** High

Good morning – the response time has been changed to **June 1<sup>st</sup>** instead of the original **August 1<sup>st</sup>** request.

Please review and provide comments/approval for the attached Foreign Vessel Cruise for Scientific Research (Shark species including White Shark).

I have asked NCR to have the applicant provide us with a Map of the Area to be studied, as the areas are only recorded under section 3 of the application. Placentia Bay, Nfld is listed, but as we do not licence vessels for other waters, I will notify Nfld licensing that this application will be reviewed and no doubt, approved for our waters. If Nfld requests that Placentia Bay be included, we will do that.

Thanks and have a nice day!

Charlene Cleveland  
Regional Officer, Licensing Services  
Dept of Fisheries & Oceans  
Dartmouth, Nova Scotia  
Tel: (902) 426-9966  
Fax: (902) 426-5010  
[Licence.maritimes.permis@dfo-mpo.gc.ca](mailto:Licence.maritimes.permis@dfo-mpo.gc.ca)

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**From:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO)  
**Sent:** 2017–November-30 1:14 PM  
**To:** Licence Maritimes / Permis Maritimes (DFO/MPO); Duggan, Charmaine; Kean, Jackie; Bowdring, Tony  
**Cc:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO); Lavigne, Élise; Farr, Connie; Chmiel, Jim;  
[HlxEcareg1@innav.gc.ca](mailto:HlxEcareg1@innav.gc.ca)  
**Subject:** IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Good afternoon,

Please see attached US Marine Scientific Research (MSR) request for the **OCEARCH, Sep 1 – Oct 31, 2018**. It appears as though the proponent intends to conduct work in both Newfoundland and Maritimes Regions (though primarily in Maritimes).

The vessel intends to call on Halifax, NS, between **Sep 9 – Oct 31, 2018**, for provisioning.

We kindly request all responses by **August 1, 2018**.

Best wishes,

Andrew

**Cleveland, Charlene**

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**From:** Cleveland, Charlene  
**Sent:** 2018-May-28 9:36 AM  
**To:** Daley, Annette; Licence Maritimes / Permis Maritimes (DFO/MPO)  
**Cc:** Berthier, Jacinta; Docherty, Verna; MacDonald, Carl  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

**Follow Up Flag:** Follow up  
**Flag Status:** Completed

Good morning Annette – yes, any concerns that Science or RM has regarding the research activity of the Foreign Vessel Application are recorded on the Foreign Fishing Vessel Licence Approval Form **by the Director**, which I update on the **final FFVLA** form that is distributed to the RD and then the RDG for signatures. Once the application is approved by the RDG, the actual licence is created in MARFIS and these conditions are copied to the licence that is issued to the foreign vessel.

I would ask that any conditions that Alain Vezina and Carl wishes to implement on the licence, that it be recorded as conditions on the FFVLA.

Have a nice day!

Charlene Cleveland  
Licensing Officer  
Martimes Region – Dartmouth  
Phone: 902-426-1929  
[Charlene.cleveland@dfo-mpo.gc.ca](mailto:Charlene.cleveland@dfo-mpo.gc.ca)

---

**From:** Daley, Annette  
**Sent:** 2018-May-28 8:54 AM  
**To:** Licence Maritimes / Permis Maritimes (DFO/MPO)  
**Cc:** Berthier, Jacinta; Docherty, Verna; MacDonald, Carl  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)



Charlene, when RM completes the boxes in the form and add any conditions as Science has, the completed form should be sent around for sign off by RDs, before going to the RDG. Thx

*Annette*

**From:** Vézina, Alain  
**Sent:** Monday, May 28, 2018 7:08 AM  
**To:** Daley, Annette <Annette.Daley@dfo-mpo.gc.ca>



**Cc:** Berthier, Jacinta <Jacinta.Berthier@dfo-mpo.gc.ca>; Docherty, Verna <Verna.Docherty@dfo-mpo.gc.ca>; MacDonald, Carl <Carl.MacDonald@dfo-mpo.gc.ca>; Licence Maritimes / Permis Maritimes (DFO/MPO) <RegionalLicensing.XMAR@dfo-mpo.gc.ca>; Herbert, Glen <Glen.Herbert@dfo-mpo.gc.ca>; Pye, Brad <Brad.Pye@dfo-mpo.gc.ca>; King, Rhea L <Rhea.King@dfo-mpo.gc.ca>; Lambert, Robert <Robert.Lambert@dfo-mpo.gc.ca>  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Thanks Annette,

From Science's perspective, conditions that flow from my concerns are those that are generally applied by coastal states under the UNCLOS MSR guidelines, i.e.

A preliminary report is submitted to <appropriate office in GAC> no later than x months after the end date of the authorized mission.

A copy of all the data collected during the marine scientific research activities is provided to us.

A copy of the final report produced that incorporates information obtained from the marine scientific research is provided to us no later than x years after the end of the mission.

These are the conditions that are imposed on us when we ask for permission to operate in US waters. I have no idea what GAC requires already in their consent letter and if these conditions are included. If they are, fine. If not, this is the minimum we need to do to ensure that we do our due diligence.

**IMPORTANT:** [REDACTED] RM also has some serious questions about use of bait, coordination with Canadian research, etc .... that should be turned into conditions. Also how will we ensure that the observer condition on the SARA permit is met? [REDACTED]

Alain

**From:** Daley, Annette

**Sent:** May 25, 2018 4:33 PM

**To:** Vézina, Alain <Alain.Vezina@dfo-mpo.gc.ca>

**Cc:** Berthier, Jacinta <Jacinta.Berthier@dfo-mpo.gc.ca>; Docherty, Verna <Verna.Docherty@dfo-mpo.gc.ca>; MacDonald, Carl <Carl.MacDonald@dfo-mpo.gc.ca>; Licence Maritimes / Permis Maritimes (DFO/MPO) <RegionalLicensing.XMAR@dfo-mpo.gc.ca>; Herbert, Glen <Glen.Herbert@dfo-mpo.gc.ca>; Pye, Brad <Brad.Pye@dfo-mpo.gc.ca>; King, Rhea L <Rhea.King@dfo-mpo.gc.ca>; Lambert, Robert <Robert.Lambert@dfo-mpo.gc.ca>

**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Alain and Rhea - The recommendation has not gone back to Global Affairs so Ocearch has not been informed. Therefore we will go back around with the review process and perhaps Alain, there is a section in the form to add conditions that would be required to be met under the RDGs signature if we wanted to go that route rather than denying the application. Apparently NL is authorizing some work in Placentia Bay.

*Annette*

**From:** Vézina, Alain

**Sent:** Wednesday, May 23, 2018 1:37 PM

**To:** MacDonald, Carl <Carl.MacDonald@dfo-mpo.gc.ca>; Licence Maritimes / Permis Maritimes (DFO/MPO) <RegionalLicensing.XMAR@dfo-mpo.gc.ca>; Herbert, Glen <Glen.Herbert@dfo-mpo.gc.ca>; Pye, Brad <Brad.Pye@dfo-mpo.gc.ca>

**Cc:** Daley, Annette <Annette.Daley@dfo-mpo.gc.ca>; Berthier, Jacinta <Jacinta.Berthier@dfo-mpo.gc.ca>

**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

With respect to the questions on the science section of the approval form:

This research activity will **not** contribute to the Canadian scientific community. Canadian collaborators do not see the benefit of working with Océarch, even though they have contacted all major Atlantic Universities (Dal, Memorial, Acadia etc), DFO (Heather Bowlby, Mark Simpson), non-profits (Grand Manan Seabird and Whale Research), OTN over the last 2 years. As pointed out by Carl, Heather holds a SARA permit and has an equivalent tagging program for white shark (aka duplication of research effort on a single population of an endangered species). The area that Heather works out of is the outside of St. Margret's Bay or immediately adjacent to Mahone Bay. The main tag type they use is optimized for instantaneous geolocation (excellent opportunities for twitter) but gives no information on habitat use – as needed for SARA research questions.

Canadian scientists will **not** have access to the research data. [REDACTED]

Based on this information, I cannot recommend approval at this time. The amended approval form is attached.

Although I did not change the response in the form, I have no record of a previous approval for this organization.

Outside of my purview, but I understand that the SARA permit requires a DFO observer during at least part of their trip. How will that condition be fulfilled?

Alain

**From:** MacDonald, Carl

**Sent:** May 23, 2018 10:32 AM

**To:** Licence Maritimes / Permis Maritimes (DFO/MPO) <[RegionalLicensing.XMAR@dfo-mpo.gc.ca](mailto:RegionalLicensing.XMAR@dfo-mpo.gc.ca)>; Vézina, Alain <[Alain.Vezina@dfo-mpo.gc.ca](mailto:Alain.Vezina@dfo-mpo.gc.ca)>; Herbert, Glen <[Glen.Herbert@dfo-mpo.gc.ca](mailto:Glen.Herbert@dfo-mpo.gc.ca)>; Pye, Brad <[Brad.Pye@dfo-mpo.gc.ca](mailto:Brad.Pye@dfo-mpo.gc.ca)>

**Cc:** Daley, Annette <[Annette.Daley@dfo-mpo.gc.ca](mailto:Annette.Daley@dfo-mpo.gc.ca)>; Berthier, Jacinta <[Jacinta.Berthier@dfo-mpo.gc.ca](mailto:Jacinta.Berthier@dfo-mpo.gc.ca)>

**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Questions/Comments Regarding Proposed Research:

- Would it be possible for the researcher to describe the bait type they propose to use? ie Will the researcher be using Marine Mammal parts for Bait? If so, where will this Marine Mammal bait be acquired?
- Would it be possible for the researcher to be more specific regarding the shark species intended for this research? Currently the document only indicates Shark Species - including White Shark.
- It is important to note that Canadian shark researcher (Heather Bowlby) has been approved to conducted research on the same species (White Shark) in the same area (Mahone Bay).

Regards,

Carl MacDonald

Resource Management

Fisheries & Oceans Canada | Government of Canada

[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca) | Tel: 902-293-8257 | Fax: 902-426-7967

Regional agent principal de gestion des peches, Gestion des ressources

Pêches et Océans Canada | Gouvernement du Canada  
Carl.MacDonald@dfo-mpo.gc.ca | Tél: 902-293-8257 | Télécopieur: 902-426-7967

---

**From:** MacDonald, Carl  
**Sent:** 2018-May-22 4:06 PM  
**To:** Licence Maritimes / Permis Maritimes (DFO/MPO); Vézina, Alain; Herbert, Glen; Pye, Brad  
**Cc:** Daley, Annette  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Large Pelagic Comments:

1. *Large pelagic sector.* Pelagic longline fishing takes place along the edge of the Scotian Shelf where the large pelagic fleet conducts operations. Caution must be taken to ensure that the scientific research vessel does not cross previously deployed pelagic longlines which run near the surface for distances of 30 - 40 nm. Damaged gear and identifying marks are to be reported to DFO ([Brad.Pye@dfo-mpo.gc.ca](mailto:Brad.Pye@dfo-mpo.gc.ca)) immediately. Vessel is to continuously broadcast an AIS signal.
  - Swordfish longline gear may be in other areas.
  - Pelagic Longline Gear have AIS beacons attached.
  - Beacons from a licence holder have the same vessel prefix on each beacon [REDACTED]
  - There will be a string of beacons on a line. It is not possible to travel between the beacons with the research vessel.
  - It is possible to travel a suitable distance alongside a pelagic longline set.

Regards,

Carl MacDonald  
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 Fisheries & Oceans Canada | Government of Canada  
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**From:** Licence Maritimes / Permis Maritimes (DFO/MPO)  
**Sent:** 2018-May-18 10:24 AM  
**To:** Vézina, Alain; Herbert, Glen; Pye, Brad; MacDonald, Carl  
**Cc:** Daley, Annette  
**Subject:** FW: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)  
**Importance:** High

Good morning – the response time has been changed to **June 1<sup>st</sup>** instead of the original **August 1<sup>st</sup>** request.

Please review and provide comments/approval for the attached Foreign Vessel Cruise for Scientific Research (Shark species including White Shark).

I have asked NCR to have the applicant provide us with a Map of the Area to be studied, as the areas are only recorded under section 3 of the application. Placentia Bay, Nfld is listed, but as we do not licence vessels for other waters, I will notify Nfld licensing that this application will be reviewed and no doubt, approved for our waters. If Nfld requests that Placentia Bay be included, we will do that.

Thanks and have a nice day!

Charlene Cleveland  
Regional Officer, Licensing Services  
Dept of Fisheries & Oceans  
Dartmouth, Nova Scotia  
Tel: (902) 426-9966  
Fax: (902) 426-5010  
[Licence.maritimes.permiss@dfo-mpo.gc.ca](mailto:Licence.maritimes.permiss@dfo-mpo.gc.ca)

---

**From:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO)  
**Sent:** 2017–November-30 1:14 PM  
**To:** Licence Maritimes / Permis Maritimes (DFO/MPO); Duggan, Charmaine; Kean, Jackie; Bowdring, Tony  
**Cc:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO); Lavigne, Élise; Farr, Connie; Chmiel, Jim;  
[HlxEcareg1@innav.gc.ca](mailto:HlxEcareg1@innav.gc.ca)  
**Subject:** IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Good afternoon,

Please see attached US Marine Scientific Research (MSR) request for the **OCEARCH, Sep 1 – Oct 31, 2018**. It appears as though the proponent intends to conduct work in both Newfoundland and Maritimes Regions (though primarily in Maritimes).

The vessel intends to call on Halifax, NS, between **Sep 9 – Oct 31, 2018**, for provisioning.

We kindly request all responses by **August 1, 2018**.

Best wishes,

Andrew

## MacLellan, Elizabeth

---

**From:** Daley, Annette  
**Sent:** Monday, May 28, 2018 5:36 PM  
**To:** Docherty, Verna; Licence Maritimes / Permis Maritimes (DFO/MPO)  
**Subject:** FYI: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

*Annette*

**From:** Vézina, Alain  
**Sent:** Monday, May 28, 2018 5:10 PM  
**To:** Daley, Annette <Annette.Daley@dfo-mpo.gc.ca>; King, Rhea L <Rhea.King@dfo-mpo.gc.ca>; Humphrey, Donald <Donald.Humphrey@dfo-mpo.gc.ca>  
**Cc:** Lambert, Robert <Robert.Lambert@dfo-mpo.gc.ca>  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

That is good. I am trying to finalize a couple of conditions for Science but these below will take care of most of the serious concerns.

**From:** Daley, Annette  
**Sent:** May 28, 2018 4:22 PM  
**To:** Vézina, Alain <Alain.Vezina@dfo-mpo.gc.ca>; King, Rhea L <Rhea.King@dfo-mpo.gc.ca>; Humphrey, Donald <Donald.Humphrey@dfo-mpo.gc.ca>  
**Cc:** Lambert, Robert <Robert.Lambert@dfo-mpo.gc.ca>  
**Subject:** FYI: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

**From:** MacDonald, Carl  
**Sent:** Monday, May 28, 2018 9:58 AM  
**To:** Daley, Annette <Annette.Daley@dfo-mpo.gc.ca>; Berthier, Jacinta <Jacinta.Berthier@dfo-mpo.gc.ca>  
**Cc:** Docherty, Verna <Verna.Docherty@dfo-mpo.gc.ca>; Licence Maritimes / Permis Maritimes (DFO/MPO) <RegionalLicensing.XMAR@dfo-mpo.gc.ca>  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Hi Annette and Jacinta,

For your consideration

DFO Requests the proponent to specify the shark species intended for this research. Currently the proponent only indicates Shark Species - including White Shark. Proponent is to list all species (sharks) they are conducting research on. When we know all the species – a condition can be added to specify these are the only shark species authorized to conduct research on.

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- Efforts to lure, capture, or tag sharks will not occur in close proximity (within two nautical miles) of endangered whale species, including North Atlantic Right Whales (*Eubalaena glacialis*).

- This licence does not authorize research in the area of Mahone Bay, Nova Scotia.

- The licence holder may be required to have an observer (at-sea) on board the vessel during any trip. When required to take an at-sea observer, the licence holder shall not depart from port until the at-sea observer is on board.

Regards,

Carl MacDonald  
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---

**From:** Daley, Annette  
**Sent:** 2018-May-28 8:54 AM  
**To:** Licence Maritimes / Permis Maritimes (DFO/MPO)  
**Cc:** Berthier, Jacinta; Docherty, Verna; MacDonald, Carl  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Charlene, when RM completes the boxes in the form and add any conditions as Science has, the completed form should be sent around for sign off by RDs, before going to the RDG. Thx

*Annette*

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**Sent:** Monday, May 28, 2018 7:08 AM  
**To:** Daley, Annette <[Annette.Daley@dfo-mpo.gc.ca](mailto:Annette.Daley@dfo-mpo.gc.ca)>  
**Cc:** Berthier, Jacinta <[Jacinta.Berthier@dfo-mpo.gc.ca](mailto:Jacinta.Berthier@dfo-mpo.gc.ca)>; Docherty, Verna <[Verna.Docherty@dfo-mpo.gc.ca](mailto:Verna.Docherty@dfo-mpo.gc.ca)>; MacDonald, Carl <[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca)>; Licence Maritimes / Permis Maritimes (DFO/MPO) <[RegionalLicensing.XMAR@dfo-mpo.gc.ca](mailto:RegionalLicensing.XMAR@dfo-mpo.gc.ca)>; Herbert, Glen <[Glen.Herbert@dfo-mpo.gc.ca](mailto:Glen.Herbert@dfo-mpo.gc.ca)>; Pye, Brad <[Brad.Pye@dfo-mpo.gc.ca](mailto:Brad.Pye@dfo-mpo.gc.ca)>; King, Rhea L <[Rhea.King@dfo-mpo.gc.ca](mailto:Rhea.King@dfo-mpo.gc.ca)>; Lambert, Robert <[Robert.Lambert@dfo-mpo.gc.ca](mailto:Robert.Lambert@dfo-mpo.gc.ca)>  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Thanks Annette,

From Science's perspective, conditions that flow from my concerns are those that are generally applied by coastal states under the UNCLOS MSR guidelines, i.e.

A preliminary report is submitted to <appropriate office in GAC> no later than x months after the end date of the authorized mission.

A copy of all the data collected during the marine scientific research activities is provided to us.

A copy of the final report produced that incorporates information obtained from the marine scientific research is provided to us no later than x years after the end of the mission.

These are the conditions that are imposed on us when we ask for permission to operate in US waters. I have no idea what GAC requires already in their consent letter and if these conditions are included. If they are, fine. If not, this is the minimum we need to do to ensure that we do our due diligence.

**IMPORTANT:** [REDACTED] RM also has some serious questions about use of bait, coordination with Canadian research, etc .... that should be turned into conditions. Also how will we ensure that the observer condition on the SARA permit is met? [REDACTED]

Alain

**From:** Daley, Annette

**Sent:** May 25, 2018 4:33 PM

**To:** Vézina, Alain <Alain.Vezina@dfo-mpo.gc.ca>

**Cc:** Berthier, Jacinta <Jacinta.Berthier@dfo-mpo.gc.ca>; Docherty, Verna <Verna.Docherty@dfo-mpo.gc.ca>;

MacDonald, Carl <Carl.MacDonald@dfo-mpo.gc.ca>; Licence Maritimes / Permis Maritimes (DFO/MPO)

<RegionalLicensing.XMAR@dfo-mpo.gc.ca>; Herbert, Glen <Glen.Herbert@dfo-mpo.gc.ca>; Pye, Brad <Brad.Pye@dfo-

mpo.gc.ca>; King, Rhea L <Rhea.King@dfo-mpo.gc.ca>; Lambert, Robert <Robert.Lambert@dfo-mpo.gc.ca>

**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Alain and Rhea - The recommendation has not gone back to Global Affairs so Ocearch has not been informed. Therefore we will go back around with the review process and perhaps Alain, there is a section in the form to add conditions that would be required to be met under the RDGs signature if we wanted to go that route rather than denying the application. Apparently NL is authorizing some work in Placentia Bay.

*Annette*

**From:** Vézina, Alain

**Sent:** Wednesday, May 23, 2018 1:37 PM

**To:** MacDonald, Carl <Carl.MacDonald@dfo-mpo.gc.ca>; Licence Maritimes / Permis Maritimes (DFO/MPO)

<RegionalLicensing.XMAR@dfo-mpo.gc.ca>; Herbert, Glen <Glen.Herbert@dfo-mpo.gc.ca>; Pye, Brad <Brad.Pye@dfo-mpo.gc.ca>

**Cc:** Daley, Annette <Annette.Daley@dfo-mpo.gc.ca>; Berthier, Jacinta <Jacinta.Berthier@dfo-mpo.gc.ca>

**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

With respect to the questions on the science section of the approval form:

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Although I did not change the response in the form, I have no record of a previous approval for this organization.

Outside of my purview, but I understand that the SARA permit requires a DFO observer during at least part of their trip. How will that condition be fulfilled?

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**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Questions/Comments Regarding Proposed Research:

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Regards,

Carl MacDonald

Resource Management

Fisheries & Oceans Canada | Government of Canada

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**From:** MacDonald, Carl

**Sent:** 2018-May-22 4:06 PM

**To:** Licence Maritimes / Permis Maritimes (DFO/MPO); Vézina, Alain; Herbert, Glen; Pye, Brad

**Cc:** Daley, Annette

**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)



## Large Pelagic Comments:

1. *Large pelagic sector.* Pelagic longline fishing takes place along the edge of the Scotian Shelf where the large pelagic fleet conducts operations. Caution must be taken to ensure that the scientific research vessel does not cross previously deployed pelagic longlines which run near the surface for distances of 30 - 40 nm. Damaged gear and identifying marks are to be reported to DFO ([Brad.Pye@dfo-mpo.gc.ca](mailto:Brad.Pye@dfo-mpo.gc.ca)) immediately. Vessel is to continuously broadcast an AIS signal.
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**Cc:** Daley, Annette  
**Subject:** FW: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)  
**Importance:** High

Good morning – the response time has been changed to **June 1<sup>st</sup>** instead of the original **August 1<sup>st</sup>** request.

Please review and provide comments/approval for the attached Foreign Vessel Cruise for Scientific Research (Shark species including White Shark).

I have asked NCR to have the applicant provide us with a Map of the Area to be studied, as the areas are only recorded under section 3 of the application. Placentia Bay, Nfld is listed, but as we do not licence vessels for other waters, I will notify Nfld licensing that this application will be reviewed and no doubt, approved for our waters. If Nfld requests that Placentia Bay be included, we will do that.

Thanks and have a nice day!

Charlene Cleveland  
Regional Officer, Licensing Services  
Dept of Fisheries & Oceans

Dartmouth, Nova Scotia  
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**Cc:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO); Lavigne, Élise; Farr, Connie; Chmiel, Jim;  
[HlxEcareg1@innav.gc.ca](mailto:HlxEcareg1@innav.gc.ca)

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Good afternoon,

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The vessel intends to call on Halifax, NS, between **Sep 9 – Oct 31, 2018**, for provisioning.

We kindly request all responses by **August 1, 2018**.

Best wishes,

Andrew

**MacDonald, Jennifer**

---

**From:** Spence, Koren R  
**Sent:** May-28-18 9:53 AM  
**To:** MacDonald, Jennifer  
**Subject:** RE: SARA permit - White shark

Thanks! That's what Carl is working on now (I said s.52...oops).  
Carl is looking at terms and conditions that might appease Science's concerns.

---

**From:** MacDonald, Jennifer  
**Sent:** May-28-18 9:46 AM  
**To:** Spence, Koren R  
**Subject:** RE: SARA permit - White shark

Here you go...

**Jennifer MacDonald**  
Species at Risk Management Division  
(902) 407-8175

---

**From:** Spence, Koren R  
**Sent:** May-28-18 9:31 AM  
**To:** MacDonald, Jennifer  
**Subject:** SARA permit - White shark  
**Importance:** High

Hi, Can you flip me a copy of the s.73 permit for Oearch? The White shark one. Carl is trying to figure out what requirements will go in their s.52 and we don't want to duplicate anything you guys have already included.  
Thanks

**MacDonald, Jennifer**

---

**From:** Humphrey, Donald  
**Sent:** May-28-18 9:23 PM  
**To:** MacDonald, Jennifer  
**Subject:** FW: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

**Categories:** To file

FYI

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**From:** Daley, Annette  
**Sent:** May-28-18 4:22 PM  
**To:** Vézina, Alain; King, Rhea L; Humphrey, Donald  
**Cc:** Lambert, Robert  
**Subject:** FYI: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

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**To:** Daley, Annette <Annette.Daley@dfo-mpo.gc.ca>; Berthier, Jacinta <Jacinta.Berthier@dfo-mpo.gc.ca>  
**Cc:** Docherty, Verna <Verna.Docherty@dfo-mpo.gc.ca>; Licence Maritimes / Permis Maritimes (DFO/MPO) <RegionalLicensing.XMAR@dfo-mpo.gc.ca>  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)


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Régional agent principal de gestion des pêches, Gestion des ressources  
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**From:** Vézina, Alain  
**Sent:** Monday, May 28, 2018 7:08 AM  
**To:** Daley, Annette <[Annette.Daley@dfo-mpo.gc.ca](mailto:Annette.Daley@dfo-mpo.gc.ca)>  
**Cc:** Berthier, Jacinta <[Jacinta.Berthier@dfo-mpo.gc.ca](mailto:Jacinta.Berthier@dfo-mpo.gc.ca)>; Docherty, Verna <[Verna.Docherty@dfo-mpo.gc.ca](mailto:Verna.Docherty@dfo-mpo.gc.ca)>; MacDonald, Carl <[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca)>; Licence Maritimes / Permis Maritimes (DFO/MPO) <[Regionallicensing.XMAR@dfo-mpo.gc.ca](mailto:Regionallicensing.XMAR@dfo-mpo.gc.ca)>; Herbert, Glen <[Glen.Herbert@dfo-mpo.gc.ca](mailto:Glen.Herbert@dfo-mpo.gc.ca)>; Pye, Brad <[Brad.Pye@dfo-mpo.gc.ca](mailto:Brad.Pye@dfo-mpo.gc.ca)>; King, Rhea L <[Rhea.King@dfo-mpo.gc.ca](mailto:Rhea.King@dfo-mpo.gc.ca)>; Lambert, Robert <[Robert.Lambert@dfo-mpo.gc.ca](mailto:Robert.Lambert@dfo-mpo.gc.ca)>  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Thanks Annette,

From Science's perspective, conditions that flow from my concerns are those that are generally applied by coastal states under the UNCLOS MSR guidelines, i.e.

A preliminary report is submitted to <appropriate office in GAC> no later than x months after the end date of the authorized mission.

A copy of all the data collected during the marine scientific research activities is provided to us.

A copy of the final report produced that incorporates information obtained from the marine scientific research is provided to us no later than x years after the end of the mission.

These are the conditions that are imposed on us when we ask for permission to operate in US waters. I have no idea what GAC requires already in their consent letter and if these conditions are included. If they are, fine. If not, this is the minimum we need to do to ensure that we do our due diligence.

**IMPORTANT:** [REDACTED] RM also has some serious questions about use of bait, coordination with Canadian research, etc .... that should be turned into conditions. Also how will we ensure that the observer condition on the SARA permit is met? [REDACTED]

Alain

**From:** Daley, Annette

**Sent:** May 25, 2018 4:33 PM

**To:** Vézina, Alain <Alain.Vezina@dfo-mpo.gc.ca>

**Cc:** Berthier, Jacinta <Jacinta.Berthier@dfo-mpo.gc.ca>; Docherty, Verna <Verna.Docherty@dfo-mpo.gc.ca>;

MacDonald, Carl <Carl.MacDonald@dfo-mpo.gc.ca>; Licence Maritimes / Permis Maritimes (DFO/MPO)

<RegionalLicensing.XMAR@dfo-mpo.gc.ca>; Herbert, Glen <Glen.Herbert@dfo-mpo.gc.ca>; Pye, Brad <Brad.Pye@dfo-

mpo.gc.ca>; King, Rhea L <Rhea.King@dfo-mpo.gc.ca>; Lambert, Robert <Robert.Lambert@dfo-mpo.gc.ca>

**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Alain and Rhea - The recommendation has not gone back to Global Affairs so Ocearch has not been informed. Therefore we will go back around with the review process and perhaps Alain, there is a section in the form to add conditions that would be required to be met under the RDGs signature if we wanted to go that route rather than denying the application. Apparently NL is authorizing some work in Placentia Bay.

*Annette*

**From:** Vézina, Alain

**Sent:** Wednesday, May 23, 2018 1:37 PM

**To:** MacDonald, Carl <Carl.MacDonald@dfo-mpo.gc.ca>; Licence Maritimes / Permis Maritimes (DFO/MPO)

<RegionalLicensing.XMAR@dfo-mpo.gc.ca>; Herbert, Glen <Glen.Herbert@dfo-mpo.gc.ca>; Pye, Brad <Brad.Pye@dfo-mpo.gc.ca>

**Cc:** Daley, Annette <Annette.Daley@dfo-mpo.gc.ca>; Berthier, Jacinta <Jacinta.Berthier@dfo-mpo.gc.ca>

**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

With respect to the questions on the science section of the approval form:

This research activity will **not** contribute to the Canadian scientific community. Canadian collaborators do not see the benefit of working with Ocearch, even though they have contacted all major Atlantic Universities (Dal, Memorial, Acadia etc), DFO (Heather Bowlby, Mark Simpson), non-profits (Grand Manan Seabird and Whale Research), OTN over the last 2 years. As pointed out by Carl, Heather holds a SARA permit and has an equivalent tagging program for white shark (aka duplication of research effort on a single population of an endangered species). The area that Heather works out of is the outside of St. Margret's Bay or immediately adjacent to Mahone Bay. The main tag type they use is optimized for instantaneous geolocation (excellent opportunities for twitter) but gives no information on habitat use – as needed for SARA research questions.

Canadian scientists will **not** have access to the research data. [REDACTED]

Based on this information, I cannot recommend approval at this time. The amended approval form is attached.

Although I did not change the response in the form, I have no record of a previous approval for this organization.

Outside of my purview, but I understand that the SARA permit requires a DFO observer during at least part of their trip. How will that condition be fulfilled?

Alain

**From:** MacDonald, Carl

**Sent:** May 23, 2018 10:32 AM

**To:** Licence Maritimes / Permis Maritimes (DFO/MPO) <[RegionalLicensing.XMAR@dfo-mpo.gc.ca](mailto:RegionalLicensing.XMAR@dfo-mpo.gc.ca)>; Vézina, Alain <[Alain.Vezina@dfo-mpo.gc.ca](mailto:Alain.Vezina@dfo-mpo.gc.ca)>; Herbert, Glen <[Glen.Herbert@dfo-mpo.gc.ca](mailto:Glen.Herbert@dfo-mpo.gc.ca)>; Pye, Brad <[Brad.Pye@dfo-mpo.gc.ca](mailto:Brad.Pye@dfo-mpo.gc.ca)>

**Cc:** Daley, Annette <[Annette.Daley@dfo-mpo.gc.ca](mailto:Annette.Daley@dfo-mpo.gc.ca)>; Berthier, Jacinta <[Jacinta.Berthier@dfo-mpo.gc.ca](mailto:Jacinta.Berthier@dfo-mpo.gc.ca)>

**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Questions/Comments Regarding Proposed Research:

- Would it be possible for the researcher to describe the bait type they propose to use? ie Will the researcher be using Marine Mammal parts for Bait? If so, where will this Marine Mammal bait be acquired?
- Would it be possible for the researcher to be more specific regarding the shark species intended for this research? Currently the document only indicates Shark Species - including White Shark.
- It is important to note that Canadian shark researcher (Heather Bowlby) has been approved to conducted research on the same species (White Shark) in the same area (Mahone Bay).

Regards,

Carl MacDonald  
Resource Management  
Fisheries & Oceans Canada | Government of Canada  
[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca) | Tel: 902-293-8257 | Fax: 902-426-7967

Regional agent principal de gestion des peches, Gestion des ressources  
Pêches et Océans Canada | Gouvernement du Canada  
[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca) | Tél: 902-293-8257 | Télécopieur: 902-426-7967

---

**From:** MacDonald, Carl

**Sent:** 2018-May-22 4:06 PM

**To:** Licence Maritimes / Permis Maritimes (DFO/MPO); Vézina, Alain; Herbert, Glen; Pye, Brad

**Cc:** Daley, Annette

**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Large Pelagic Comments:

1. *Large pelagic sector.* Pelagic longline fishing takes place along the edge of the Scotian Shelf where the large pelagic fleet conducts operations. Caution must be taken to ensure that the scientific research vessel does not cross previously deployed pelagic longlines which run near the surface for distances of 30 - 40 nm. Damaged gear and identifying marks are to be reported to DFO ([Brad.Pye@dfo-mpo.gc.ca](mailto:Brad.Pye@dfo-mpo.gc.ca)) immediately. Vessel is to continuously broadcast an AIS signal.

- Swordfish longline gear may be in other areas.
- Pelagic Longline Gear have AIS beacons attached.
- Beacons from a licence holder have the same vessel prefix on each beacon
- There will be a string of beacons on a line. It is not possible to travel between the beacons with the research vessel.
- It is possible to travel a suitable distance alongside a pelagic longline set.

Regards,

Carl MacDonald  
Resource Management  
Fisheries & Oceans Canada | Government of Canada  
[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca) | Tel: 902-293-8257 | Fax: 902-426-7967

Regional agent principal de gestion des peches, Gestion des ressources  
Pêches et Océans Canada | Gouvernement du Canada  
[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca) | Tél: 902-293-8257 | Télécopieur: 902-426-7967

---

**From:** Licence Maritimes / Permis Maritimes (DFO/MPO)  
**Sent:** 2018-May-18 10:24 AM  
**To:** Vézina, Alain; Herbert, Glen; Pye, Brad; MacDonald, Carl  
**Cc:** Daley, Annette  
**Subject:** FW: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)  
**Importance:** High

Good morning – the response time has been changed to **June 1<sup>st</sup>** instead of the original **August 1<sup>st</sup>** request.

Please review and provide comments/approval for the attached Foreign Vessel Cruise for Scientific Research (Shark species including White Shark).

I have asked NCR to have the applicant provide us with a Map of the Area to be studied, as the areas are only recorded under section 3 of the application. Placentia Bay, Nfld is listed, but as we do not licence vessels for other waters, I will notify Nfld licensing that this application will be reviewed and no doubt, approved for our waters. If Nfld requests that Placentia Bay be included, we will do that.

Thanks and have a nice day!

Charlene Cleveland  
Regional Officer, Licensing Services  
Dept of Fisheries & Oceans  
Dartmouth, Nova Scotia  
Tel: (902) 426-9966  
Fax: (902) 426-5010  
[Licence.maritimes.permis@dfo-mpo.gc.ca](mailto:Licence.maritimes.permis@dfo-mpo.gc.ca)



---

**From:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO)

**Sent:** 2017–November-30 1:14 PM

**To:** Licence Maritimes / Permis Maritimes (DFO/MPO); Duggan, Charmaine; Kean, Jackie; Bowdring, Tony

**Cc:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO); Lavigne, Élise; Farr, Connie; Chmiel, Jim;

[HlxEcareg1@innav.gc.ca](mailto:HlxEcareg1@innav.gc.ca)

**Subject:** IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Good afternoon,

Please see attached US Marine Scientific Research (MSR) request for the **OCEARCH, Sep 1 – Oct 31, 2018**. It appears as though the proponent intends to conduct work in both Newfoundland and Maritimes Regions (though primarily in Maritimes).

The vessel intends to call on Halifax, NS, between **Sep 9 – Oct 31, 2018**, for provisioning.

We kindly request all responses by **August 1, 2018**.

Best wishes,

Andrew

## MacDonald, Jennifer

---

**From:** MacDonald, Jennifer  
**Sent:** May-28-18 10:50 AM  
**To:** Bowlby, Heather  
**Subject:** RE: SARA Section 73 Permit - White Shark Tagging

**Categories:** To file

Hi Heather,

There are aspects of the permit information that has to be kept confidential (such as the person the permit was issued to and their personal information); however, we are required to post explanations of all permits issued on the SAR Public Registry ([http://www.registrelep-sararegistry.gc.ca/search/advSearchResults\\_e.cfm?stype=doc&lng=e&advkeywords=&docid=27&startdate=&enddate=](http://www.registrelep-sararegistry.gc.ca/search/advSearchResults_e.cfm?stype=doc&lng=e&advkeywords=&docid=27&startdate=&enddate=)). The explanation includes a summary of the activities that will take place and how it meets the pre-conditions of SARA (all reasonable alternatives considered, all feasible mitigation measures and that the activity does not jeopardize survival and recovery). The explanation will not necessarily list all the exact conditions, but it does provide quite a bit of detail.

The explanation for the OCEARCH permit is not yet posted, I'm still working on it with Nfld Region, but I can send you the link once it's up.

Thanks,  
Jenn

**Jennifer MacDonald**  
Species at Risk Management Division  
(902) 407-8175

---

**From:** Bowlby, Heather  
**Sent:** May-25-18 9:32 AM  
**To:** MacDonald, Jennifer  
**Subject:** RE: SARA Section 73 Permit - White Shark Tagging

Quick question, are SARA permits public? Aka, if I was ever asked, can I discuss the provisions in the white shark permit publically?

Thanks,  
Heather

---

**From:** MacDonald, Jennifer  
**Sent:** April-30-18 2:44 PM  
**To:** Gromack, Aimee; Bowlby, Heather  
**Subject:** FW: SARA Section 73 Permit - White Shark Tagging

FYI

**Jennifer MacDonald**  
Species at Risk Management Division  
(902) 407-8175

---

**From:** MacDonald, Jennifer  
**Sent:** April-30-18 2:44 PM

**To:** 'Robert Hueter'; Chris Fischer  
**Cc:** Humphrey, Donald; Sullivan, Katrina; Forsey, Sue  
**Subject:** SARA Section 73 Permit - White Shark Tagging

Hello Bob and Chris,

I have attached the *Species at Risk Act* Section 73 Permits authorizing activities affecting White Shark in the waters off Nova Scotia and Newfoundland and Labrador respectively. Copies of the signed permits should be kept at the work site(s) at all times. Please read the permits to ensure that you are familiar with all of the conditions including the information that must be collected and recorded, as well as the circumstances where there is a requirement to provide notification to Fisheries and Oceans Canada.

I have also attached SARA Permit Report Forms (for Maritimes and Newfoundland and Labrador respectively). You are required to submit a completed SARA Permit Report by December 31<sup>st</sup>, 2018.

Please confirm that you have received this email. Feel free to contact me if you have any questions.

Thank you,  
Jenn

**Jennifer MacDonald**

Species at Risk Biologist | Biologiste des espèces en péril  
Species at Risk Management Division | Division de la gestion des espèces en péril  
Ecosystem Management | Gestion des écosystèmes  
Fisheries & Oceans Canada | Pêches & Océans Canada  
P.O. Box 1006 Dartmouth N.S. | C.P. 1006 Dartmouth N.E. B2Y 4A2  
Tel | Tél: (902) 407-8175 Fax | Téléc: (902) 426-2331  
Email | Courriel: [jennifer.macdonald@dfo-mpo.gc.ca](mailto:jennifer.macdonald@dfo-mpo.gc.ca)

## MacLellan, Elizabeth

---

**From:** Daley, Annette  
**Sent:** Tuesday, May 29, 2018 9:15 AM  
**To:** Docherty, Verna  
**Subject:** Fw: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Annette Daley  
A/Regional Director, Fisheries Management  
Fisheries and Oceans Canada | Government of Canada  
Annette.Daley@dfo-mpo.gc.ca |  
Telephone: 902-426-9962 | Facsimile: 902-426-7967

Directrice régionale par interim, Gestion des pêches  
Pêches et Océans Canada | Gouvernement du Canada  
Annette.Daley@dfo-mpo.gc.ca |  
Téléphone: 902-426-9962 | Télécopieur: 902-426-7967

---

**From:** Vézina, Alain <Alain.Vezina@dfo-mpo.gc.ca>  
**Sent:** Tuesday, May 29, 2018 7:15 AM  
**To:** Humphrey, Donald; Daley, Annette; King, Rhea L  
**Cc:** Lambert, Robert  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Donald,

[REDACTED] there are no plans for DFO science to participate in the OCEARCH mission or collaborate with this organization.

What advice did you receive from Science on the SARA permitting for this research?

Alain

**From:** Humphrey, Donald  
**Sent:** May 28, 2018 9:23 PM  
**To:** Daley, Annette <Annette.Daley@dfo-mpo.gc.ca>; Vézina, Alain <Alain.Vezina@dfo-mpo.gc.ca>; King, Rhea L <Rhea.King@dfo-mpo.gc.ca>  
**Cc:** Lambert, Robert <Robert.Lambert@dfo-mpo.gc.ca>  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Hi Annette, just a few comments/questions below for consideration.

I should note that we attempted to coordinate our SARA permitting process with that of RM but have regulatory timelines that had to be met and could not be aligned with the timeframe for this approval process.

Thanks, Donald

---

**From:** Daley, Annette  
**Sent:** May-28-18 4:22 PM  
**To:** Vézina, Alain; King, Rhea L; Humphrey, Donald  
**Cc:** Lambert, Robert  
**Subject:** FYI: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

**From:** MacDonald, Carl  
**Sent:** Monday, May 28, 2018 9:58 AM  
**To:** Daley, Annette <Annette.Daley@dfo-mpo.gc.ca>; Berthier, Jacinta <Jacinta.Berthier@dfo-mpo.gc.ca>  
**Cc:** Docherty, Verna <Verna.Docherty@dfo-mpo.gc.ca>; Licence Maritimes / Permis Maritimes (DFO/MPO) <RegionalLicensing.XMAR@dfo-mpo.gc.ca>  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

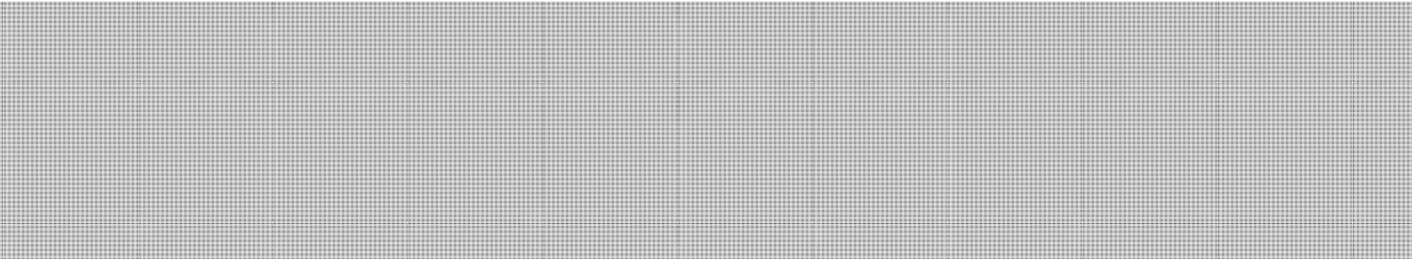
Hi Annette and Jacinta,

For your consideration

DFO Requests the proponent to specify the shark species intended for this research. Currently the proponent only indicates Shark Species - including White Shark. Proponent is to list all species (sharks) they are conducting research on. When we know all the species – a condition can be added to specify these are the only shark species authorized to conduct research on.

Conditions

- Marine mammal parts may not be offered to sharks for feeding or consumption, will not be ingested by sharks, and pieces of marine mammal tissue will not be thrown overboard to attract sharks.
- Efforts to lure, capture, or tag sharks will not occur in close proximity (within two nautical miles) of endangered whale species, including North Atlantic Right Whales (*Eubalaena glacialis*). What is the rationale here?
- This licence does not authorize research in the area of Mahone Bay, Nova Scotia.

- 
- The licence holder may be required to have an observer (at-sea) on board the vessel during any trip. When required to take an at-sea observer, the licence holder shall not depart from port until the at-sea observer is on board. We included a condition to have observers on board to allow for staff to participate on one or more voyages to assess compliance with conditions of the SARA permit. Ideally, we would like Science to participate as well, but recognize that this may not be possible due to other commitments and constraints.

Regards,

Carl MacDonald  
Resource Management

Fisheries & Oceans Canada | Government of Canada  
[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca) | Tel: 902-293-8257 | Fax: 902-426-7967

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---

**From:** Daley, Annette  
**Sent:** 2018-May-28 8:54 AM  
**To:** Licence Maritimes / Permis Maritimes (DFO/MPO)  
**Cc:** Berthier, Jacinta; Docherty, Verna; MacDonald, Carl  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Charlene, when RM completes the boxes in the form and add any conditions as Science has, the completed form should be sent around for sign off by RDs, before going to the RDG. Thx

*Annette*

**From:** Vézina, Alain  
**Sent:** Monday, May 28, 2018 7:08 AM  
**To:** Daley, Annette <[Annette.Daley@dfo-mpo.gc.ca](mailto:Annette.Daley@dfo-mpo.gc.ca)>  
**Cc:** Berthier, Jacinta <[Jacinta.Berthier@dfo-mpo.gc.ca](mailto:Jacinta.Berthier@dfo-mpo.gc.ca)>; Docherty, Verna <[Verna.Docherty@dfo-mpo.gc.ca](mailto:Verna.Docherty@dfo-mpo.gc.ca)>; MacDonald, Carl <[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca)>; Licence Maritimes / Permis Maritimes (DFO/MPO) <[RegionalLicensing.XMAR@dfo-mpo.gc.ca](mailto:RegionalLicensing.XMAR@dfo-mpo.gc.ca)>; Herbert, Glen <[Glen.Herbert@dfo-mpo.gc.ca](mailto:Glen.Herbert@dfo-mpo.gc.ca)>; Pye, Brad <[Brad.Pye@dfo-mpo.gc.ca](mailto:Brad.Pye@dfo-mpo.gc.ca)>; King, Rhea L <[Rhea.King@dfo-mpo.gc.ca](mailto:Rhea.King@dfo-mpo.gc.ca)>; Lambert, Robert <[Robert.Lambert@dfo-mpo.gc.ca](mailto:Robert.Lambert@dfo-mpo.gc.ca)>  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Thanks Annette,

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Alain

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**Sent:** May 25, 2018 4:33 PM

**To:** Vézina, Alain <[Alain.Vezina@dfo-mpo.gc.ca](mailto:Alain.Vezina@dfo-mpo.gc.ca)>

**Cc:** Berthier, Jacinta <[Jacinta.Berthier@dfo-mpo.gc.ca](mailto:Jacinta.Berthier@dfo-mpo.gc.ca)>; Docherty, Verna <[Verna.Docherty@dfo-mpo.gc.ca](mailto:Verna.Docherty@dfo-mpo.gc.ca)>;

MacDonald, Carl <[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca)>; Licence Maritimes / Permis Maritimes (DFO/MPO)

<[RegionalLicensing.XMAR@dfo-mpo.gc.ca](mailto:RegionalLicensing.XMAR@dfo-mpo.gc.ca)>; Herbert, Glen <[Glen.Herbert@dfo-mpo.gc.ca](mailto:Glen.Herbert@dfo-mpo.gc.ca)>; Pye, Brad <[Brad.Pye@dfo-mpo.gc.ca](mailto:Brad.Pye@dfo-mpo.gc.ca)>;

King, Rhea L <[Rhea.King@dfo-mpo.gc.ca](mailto:Rhea.King@dfo-mpo.gc.ca)>; Lambert, Robert <[Robert.Lambert@dfo-mpo.gc.ca](mailto:Robert.Lambert@dfo-mpo.gc.ca)>

**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Alain and Rhea - The recommendation has not gone back to Global Affairs so Ocearch has not been informed. Therefore we will go back around with the review process and perhaps Alain, there is a section in the form to add conditions that would be required to be met under the RDGs signature if we wanted to go that route rather than denying the application. Apparently NL is authorizing some work in Placentia Bay.

*Annette*

**From:** Vézina, Alain

**Sent:** Wednesday, May 23, 2018 1:37 PM

**To:** MacDonald, Carl <[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca)>; Licence Maritimes / Permis Maritimes (DFO/MPO)

<[RegionalLicensing.XMAR@dfo-mpo.gc.ca](mailto:RegionalLicensing.XMAR@dfo-mpo.gc.ca)>; Herbert, Glen <[Glen.Herbert@dfo-mpo.gc.ca](mailto:Glen.Herbert@dfo-mpo.gc.ca)>; Pye, Brad <[Brad.Pye@dfo-mpo.gc.ca](mailto:Brad.Pye@dfo-mpo.gc.ca)>

**Cc:** Daley, Annette <[Annette.Daley@dfo-mpo.gc.ca](mailto:Annette.Daley@dfo-mpo.gc.ca)>; Berthier, Jacinta <[Jacinta.Berthier@dfo-mpo.gc.ca](mailto:Jacinta.Berthier@dfo-mpo.gc.ca)>

**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

With respect to the questions on the science section of the approval form:

This research activity will **not** contribute to the Canadian scientific community. Canadian collaborators do not see the benefit of working with Ocearch, even though they have contacted all major Atlantic Universities (Dal, Memorial, Acadia etc), DFO (Heather Bowlby, Mark Simpson), non-profits (Grand Manan Seabird and Whale Research), OTN over the last 2 years. As pointed out by Carl, Heather holds a SARA permit and has an equivalent tagging program for white shark (aka duplication of research effort on a single population of an endangered species). The area that Heather works out of is the outside of St. Margret's Bay or immediately adjacent to Mahone Bay. The main tag type they use is optimized for instantaneous geolocation (excellent opportunities for twitter) but gives no information on habitat use – as needed for SARA research questions.

Canadian scientists will **not** have access to the research data. [REDACTED]

Based on this information, I cannot recommend approval at this time. The amended approval form is attached.

Although I did not change the response in the form, I have no record of a previous approval for this organization.

Outside of my purview, but I understand that the SARA permit requires a DFO observer during at least part of their trip. How will that condition be fulfilled?

Alain

**From:** MacDonald, Carl

**Sent:** May 23, 2018 10:32 AM

**To:** Licence Maritimes / Permis Maritimes (DFO/MPO) <[RegionalLicensing.XMAR@dfo-mpo.gc.ca](mailto:RegionalLicensing.XMAR@dfo-mpo.gc.ca)>; Vézina, Alain <[Alain.Vezina@dfo-mpo.gc.ca](mailto:Alain.Vezina@dfo-mpo.gc.ca)>; Herbert, Glen <[Glen.Herbert@dfo-mpo.gc.ca](mailto:Glen.Herbert@dfo-mpo.gc.ca)>; Pye, Brad <[Brad.Pye@dfo-mpo.gc.ca](mailto:Brad.Pye@dfo-mpo.gc.ca)>

**Cc:** Daley, Annette <[Annette.Daley@dfo-mpo.gc.ca](mailto:Annette.Daley@dfo-mpo.gc.ca)>; Berthier, Jacinta <[Jacinta.Berthier@dfo-mpo.gc.ca](mailto:Jacinta.Berthier@dfo-mpo.gc.ca)>

**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Questions/Comments Regarding Proposed Research:

- Would it be possible for the researcher to describe the bait type they propose to use? ie Will the researcher be using Marine Mammal parts for Bait? If so, where will this Marine Mammal bait be acquired?
- Would it be possible for the researcher to be more specific regarding the shark species intended for this research? Currently the document only indicates Shark Species - including White Shark.
- It is important to note that Canadian shark researcher (Heather Bowlby) has been approved to conducted research on the same species (White Shark) in the same area (Mahone Bay).

Regards,

Carl MacDonald  
Resource Management  
Fisheries & Oceans Canada | Government of Canada  
[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca) | Tel: 902-293-8257 | Fax: 902-426-7967

Regional agent principal de gestion des peches, Gestion des ressources  
Pêches et Océans Canada | Gouvernement du Canada  
[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca) | Tél: 902-293-8257 | Télécopieur: 902-426-7967

---

**From:** MacDonald, Carl

**Sent:** 2018-May-22 4:06 PM

**To:** Licence Maritimes / Permis Maritimes (DFO/MPO); Vézina, Alain; Herbert, Glen; Pye, Brad

**Cc:** Daley, Annette

**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Large Pelagic Comments:

1. *Large pelagic sector.* Pelagic longline fishing takes place along the edge of the Scotian Shelf where the large pelagic fleet conducts operations. Caution must be taken to ensure that the scientific research vessel does not cross previously deployed pelagic longlines which run near the surface for distances of 30 - 40 nm. Damaged gear and identifying marks are to be reported to DFO ([Brad.Pye@dfo-mpo.gc.ca](mailto:Brad.Pye@dfo-mpo.gc.ca)) immediately. Vessel is to continuously broadcast an AIS signal.
- Swordfish longline gear may be in other areas.
  - Pelagic Longline Gear have AIS beacons attached.



- Beacons from a licence holder have the same vessel prefix on each beacon
- There will be a string of beacons on a line. It is not possible to travel between the beacons with the research vessel.
- It is possible to travel a suitable distance alongside a pelagic longline set.

Regards,

Carl MacDonald  
Resource Management  
Fisheries & Oceans Canada | Government of Canada  
[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca) | Tel: 902-293-8257 | Fax: 902-426-7967

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---

**From:** Licence Maritimes / Permis Maritimes (DFO/MPO)  
**Sent:** 2018-May-18 10:24 AM  
**To:** Vézina, Alain; Herbert, Glen; Pye, Brad; MacDonald, Carl  
**Cc:** Daley, Annette  
**Subject:** FW: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)  
**Importance:** High

Good morning – the response time has been changed to **June 1<sup>st</sup>** instead of the original August 1<sup>st</sup> request.

Please review and provide comments/approval for the attached Foreign Vessel Cruise for Scientific Research (Shark species including White Shark).

I have asked NCR to have the applicant provide us with a Map of the Area to be studied, as the areas are only recorded under section 3 of the application. Placentia Bay, Nfld is listed, but as we do not licence vessels for other waters, I will notify Nfld licensing that this application will be reviewed and no doubt, approved for our waters. If Nfld requests that Placentia Bay be included, we will do that.

Thanks and have a nice day!

Charlene Cleveland  
Regional Officer, Licensing Services  
Dept of Fisheries & Oceans  
Dartmouth, Nova Scotia  
Tel: (902) 426-9966  
Fax: (902) 426-5010  
[Licence.maritimes.permanis@dfo-mpo.gc.ca](mailto:Licence.maritimes.permanis@dfo-mpo.gc.ca)

---

**From:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO)  
**Sent:** 2017-November-30 1:14 PM  
**To:** Licence Maritimes / Permis Maritimes (DFO/MPO); Duggan, Charmaine; Kean, Jackie; Bowdring, Tony  
**Cc:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO); Lavigne, Élise; Farr, Connie; Chmiel, Jim;

[HlxEcareg1@innav.gc.ca](mailto:HlxEcareg1@innav.gc.ca)

**Subject:** IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Good afternoon,

Please see attached US Marine Scientific Research (MSR) request for the **OCEARCH, Sep 1 – Oct 31, 2018**. It appears as though the proponent intends to conduct work in both Newfoundland and Maritimes Regions (though primarily in Maritimes).

The vessel intends to call on Halifax, NS, between **Sep 9 – Oct 31, 2018**, for provisioning.

We kindly request all responses by **August 1, 2018**.

Best wishes,

Andrew

## MacDonald, Jennifer

---

**From:** Herbert, Glen  
**Sent:** May-29-18 11:36 AM  
**To:** Humphrey, Donald  
**Cc:** King, Rhea L  
**Subject:** FW: FYI: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Hi Donald,

As you know, this research approval is making its way through the process again.

The EM conditions included so far are the usual RW guidance, as follows:

- R/V to report sightings of North Atlantic right whales (same day if possible) to DFO Maritimes Region. Contact: 1-844-800-8568; [XMARWhalesightings@dfo-mpo.gc.ca](mailto:XMARWhalesightings@dfo-mpo.gc.ca). All whale records (post voyage), including location, date and photos, to be submitted to DFO Maritimes Region.
- R/V to adhere to guidance contained in Canadian Coast Guard Annual Notice to Mariners: A2 - 5. GENERAL GUIDELINES FOR AQUATIC SPECIES AT RISK AND IMPORTANT MARINE MAMMAL AREAS: Grand Manan Basin Critical Habitat and Roseway Basin Critical Habitat/Area To Be Avoided. See: <https://www.notmar.gc.ca/publications/annual-annuel/section-a/a5-en.php>
- R/V to report any collisions with whales, entangled whales or dead whales to the whale emergency hotline (1-866-567-6277), VHF Channel 16, or Fundy Traffic VHF Channel 14.

Once this has been resolved, let me know and I can let RM Licensing know we are fine with the approval.

Thanks,  
Glen

---

Glen Herbert  
Regional Manager  
Oceans and Coastal Management Division  
Ecosystem Management Branch  
Fisheries and Oceans Canada – Maritimes Region  
Bedford Institute of Oceanography  
1 Challenger Dr., PO Box 1006  
5th Floor, Polaris Bldg.  
Dartmouth, NS, B2Y 4A2  
Tel: (902) 802 7051  
Email: [glen.herbert@dfo-mpo.gc.ca](mailto:glen.herbert@dfo-mpo.gc.ca)

**From:** MacDonald, Carl  
**Sent:** Monday, May 28, 2018 9:58 AM  
**To:** Daley, Annette <[Annette.Daley@dfo-mpo.gc.ca](mailto:Annette.Daley@dfo-mpo.gc.ca)>; Berthier, Jacinta <[Jacinta.Berthier@dfo-mpo.gc.ca](mailto:Jacinta.Berthier@dfo-mpo.gc.ca)>  
**Cc:** Docherty, Verna <[Verna.Docherty@dfo-mpo.gc.ca](mailto:Verna.Docherty@dfo-mpo.gc.ca)>; Licence Maritimes / Permis Maritimes (DFO/MPO) <[RegionalLicensing.XMAR@dfo-mpo.gc.ca](mailto:RegionalLicensing.XMAR@dfo-mpo.gc.ca)>  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Hi Annette and Jacinta,

For your consideration

DFO Requests the proponent to specify the shark species intended for this research. Currently the proponent only indicates Shark Species - including White Shark. Proponent is to list all species (sharks) they are conducting research on. When we know all the species – a condition can be added to specify these are the only shark species authorized to conduct research on.

Conditions

- Marine mammal parts may not be offered to sharks for feeding or consumption, will not be ingested by sharks, and pieces of marine mammal tissue will not be thrown overboard to attract sharks.
- Efforts to lure, capture, or tag sharks will not occur in close proximity (within two nautical miles) of endangered whale species, including North Atlantic Right Whales (*Eubalaena glacialis*).
- This licence does not authorize research in the area of Mahone Bay, Nova Scotia.

- The licence holder may be required to have an observer (at-sea) on board the vessel during any trip. When required to take an at-sea observer, the licence holder shall not depart from port until the at-sea observer is on board.

Regards,

Carl MacDonald  
Resource Management  
Fisheries & Oceans Canada | Government of Canada  
[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca) | Tel: 902-293-8257 | Fax: 902-426-7967

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---

**From:** Daley, Annette  
**Sent:** 2018-May-28 8:54 AM  
**To:** Licence Maritimes / Permis Maritimes (DFO/MPO)  
**Cc:** Berthier, Jacinta; Docherty, Verna; MacDonald, Carl  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Charlene, when RM completes the boxes in the form and add any conditions as Science has, the completed form should be sent around for sign off by RDs, before going to the RDG. Thx

*Annette*

**From:** Vézina, Alain  
**Sent:** Monday, May 28, 2018 7:08 AM  
**To:** Daley, Annette <[Annette.Daley@dfo-mpo.gc.ca](mailto:Annette.Daley@dfo-mpo.gc.ca)>  
**Cc:** Berthier, Jacinta <[Jacinta.Berthier@dfo-mpo.gc.ca](mailto:Jacinta.Berthier@dfo-mpo.gc.ca)>; Docherty, Verna <[Verna.Docherty@dfo-mpo.gc.ca](mailto:Verna.Docherty@dfo-mpo.gc.ca)>; MacDonald, Carl <[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca)>; Licence Maritimes / Permis Maritimes (DFO/MPO) <[RegionalLicensing.XMAR@dfo-mpo.gc.ca](mailto:RegionalLicensing.XMAR@dfo-mpo.gc.ca)>; Herbert, Glen <[Glen.Herbert@dfo-mpo.gc.ca](mailto:Glen.Herbert@dfo-mpo.gc.ca)>; Pye, Brad <[Brad.Pye@dfo-mpo.gc.ca](mailto:Brad.Pye@dfo-mpo.gc.ca)>; King, Rhea L <[Rhea.King@dfo-mpo.gc.ca](mailto:Rhea.King@dfo-mpo.gc.ca)>; Lambert, Robert <[Robert.Lambert@dfo-mpo.gc.ca](mailto:Robert.Lambert@dfo-mpo.gc.ca)>  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Thanks Annette,

From Science's perspective, conditions that flow from my concerns are those that are generally applied by coastal states under the UNCLOS MSR guidelines, i.e.

A preliminary report is submitted to <appropriate office in GAC> no later than x months after the end date of the authorized mission.

A copy of all the data collected during the marine scientific research activities is provided to us.

A copy of the final report produced that incorporates information obtained from the marine scientific research is provided to us no later than x years after the end of the mission.

These are the conditions that are imposed on us when we ask for permission to operate in US waters. I have no idea what GAC requires already in their consent letter and if these conditions are included. If they are, fine. If not, this is the minimum we need to do to ensure that we do our due diligence.

**IMPORTANT:** [REDACTED] RM also has some serious questions about use of bait, coordination with Canadian research, etc .... that should be turned into conditions. Also how will we ensure that the observer condition on the SARA permit is met? [REDACTED]

Alain

**From:** Daley, Annette  
**Sent:** May 25, 2018 4:33 PM  
**To:** Vézina, Alain <[Alain.Vezina@dfo-mpo.gc.ca](mailto:Alain.Vezina@dfo-mpo.gc.ca)>  
**Cc:** Berthier, Jacinta <[Jacinta.Berthier@dfo-mpo.gc.ca](mailto:Jacinta.Berthier@dfo-mpo.gc.ca)>; Docherty, Verna <[Verna.Docherty@dfo-mpo.gc.ca](mailto:Verna.Docherty@dfo-mpo.gc.ca)>; MacDonald, Carl <[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca)>; Licence Maritimes / Permis Maritimes (DFO/MPO) <[RegionalLicensing.XMAR@dfo-mpo.gc.ca](mailto:RegionalLicensing.XMAR@dfo-mpo.gc.ca)>; Herbert, Glen <[Glen.Herbert@dfo-mpo.gc.ca](mailto:Glen.Herbert@dfo-mpo.gc.ca)>; Pye, Brad <[Brad.Pye@dfo-mpo.gc.ca](mailto:Brad.Pye@dfo-mpo.gc.ca)>; King, Rhea L <[Rhea.King@dfo-mpo.gc.ca](mailto:Rhea.King@dfo-mpo.gc.ca)>; Lambert, Robert <[Robert.Lambert@dfo-mpo.gc.ca](mailto:Robert.Lambert@dfo-mpo.gc.ca)>  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Alain and Rhea - The recommendation has not gone back to Global Affairs so Ocearch has not been informed. Therefore we will go back around with the review process and perhaps Alain, there is a section in the form to add conditions that would be required to be met under the RDGs signature if we wanted to go that route rather than denying the application. Apparently NL is authorizing some work in Placentia Bay.

*Annette*

**From:** Vézina, Alain  
**Sent:** Wednesday, May 23, 2018 1:37 PM

**To:** MacDonald, Carl <Carl.MacDonald@dfo-mpo.gc.ca>; Licence Maritimes / Permis Maritimes (DFO/MPO) <RegionalLicensing.XMAR@dfo-mpo.gc.ca>; Herbert, Glen <Glen.Herbert@dfo-mpo.gc.ca>; Pye, Brad <Brad.Pye@dfo-mpo.gc.ca>  
**Cc:** Daley, Annette <Annette.Daley@dfo-mpo.gc.ca>; Berthier, Jacinta <Jacinta.Berthier@dfo-mpo.gc.ca>  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

With respect to the questions on the science section of the approval form:

This research activity will **not** contribute to the Canadian scientific community. Canadian collaborators do not see the benefit of working with Ocearch, even though they have contacted all major Atlantic Universities (Dal, Memorial, Acadia etc), DFO (Heather Bowlby, Mark Simpson), non-profits (Grand Manan Seabird and Whale Research), OTN over the last 2 years. As pointed out by Carl, Heather holds a SARA permit and has an equivalent tagging program for white shark (aka duplication of research effort on a single population of an endangered species). The area that Heather works out of is the outside of St. Margret's Bay or immediately adjacent to Mahone Bay. The main tag type they use is optimized for instantaneous geolocation (excellent opportunities for twitter) but gives no information on habitat use – as needed for SARA research questions.

Canadian scientists will **not** have access to the research data.

Based on this information, I cannot recommend approval at this time. The amended approval form is attached.

Although I did not change the response in the form, I have no record of a previous approval for this organization.

Outside of my purview, but I understand that the SARA permit requires a DFO observer during at least part of their trip. How will that condition be fulfilled?

Alain

**From:** MacDonald, Carl  
**Sent:** May 23, 2018 10:32 AM  
**To:** Licence Maritimes / Permis Maritimes (DFO/MPO) <RegionalLicensing.XMAR@dfo-mpo.gc.ca>; Vézina, Alain <Alain.Vezina@dfo-mpo.gc.ca>; Herbert, Glen <Glen.Herbert@dfo-mpo.gc.ca>; Pye, Brad <Brad.Pye@dfo-mpo.gc.ca>  
**Cc:** Daley, Annette <Annette.Daley@dfo-mpo.gc.ca>; Berthier, Jacinta <Jacinta.Berthier@dfo-mpo.gc.ca>  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Questions/Comments Regarding Proposed Research:

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- Would it be possible for the researcher to be more specific regarding the shark species intended for this research? Currently the document only indicates Shark Species - including White Shark.
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Regards,

Carl MacDonald  
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**Sent:** 2018-May-22 4:06 PM  
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**Cc:** Daley, Annette  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Large Pelagic Comments:

1. *Large pelagic sector.* Pelagic longline fishing takes place along the edge of the Scotian Shelf where the large pelagic fleet conducts operations. Caution must be taken to ensure that the scientific research vessel does not cross previously deployed pelagic longlines which run near the surface for distances of 30 - 40 nm. Damaged gear and identifying marks are to be reported to DFO ([Brad.Pye@dfo-mpo.gc.ca](mailto:Brad.Pye@dfo-mpo.gc.ca)) immediately. Vessel is to continuously broadcast an AIS signal.
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  - Pelagic Longline Gear have AIS beacons attached.
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  - There will be a string of beacons on a line. It is not possible to travel between the beacons with the research vessel.
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Regards,

Carl MacDonald  
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 Fisheries & Oceans Canada | Government of Canada  
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**Sent:** 2018-May-18 10:24 AM  
**To:** Vézina, Alain; Herbert, Glen; Pye, Brad; MacDonald, Carl  
**Cc:** Daley, Annette

**Subject:** FW: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)  
**Importance:** High

Good morning – the response time has been changed to June 1<sup>st</sup> instead of the original August 1<sup>st</sup> request.

Please review and provide comments/approval for the attached Foreign Vessel Cruise for Scientific Research (Shark species including White Shark).

I have asked NCR to have the applicant provide us with a Map of the Area to be studied, as the areas are only recorded under section 3 of the application. Placentia Bay, Nfld is listed, but as we do not licence vessels for other waters, I will notify Nfld licensing that this application will be reviewed and no doubt, approved for our waters. If Nfld requests that Placentia Bay be included, we will do that.

Thanks and have a nice day!

Charlene Cleveland  
Regional Officer, Licensing Services  
Dept of Fisheries & Oceans  
Dartmouth, Nova Scotia  
Tel: (902) 426-9966  
Fax: (902) 426-5010  
[Licence.maritimes.permiss@dfo-mpo.gc.ca](mailto:Licence.maritimes.permiss@dfo-mpo.gc.ca)

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**Sent:** 2017–November-30 1:14 PM  
**To:** Licence Maritimes / Permis Maritimes (DFO/MPO); Duggan, Charmaine; Kean, Jackie; Bowdring, Tony  
**Cc:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO); Lavigne, Élise; Farr, Connie; Chmiel, Jim;  
[HlxEcareg1@innav.gc.ca](mailto:HlxEcareg1@innav.gc.ca)  
**Subject:** IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Good afternoon,

Please see attached US Marine Scientific Research (MSR) request for the **OCEARCH, Sep 1 – Oct 31, 2018**. It appears as though the proponent intends to conduct work in both Newfoundland and Maritimes Regions (though primarily in Maritimes).

The vessel intends to call on Halifax, NS, between **Sep 9 – Oct 31, 2018**, for provisioning.

We kindly request all responses by **August 1, 2018**.

Best wishes,

Andrew



## **MacDonald, Jennifer**

---

**From:** Vézina, Alain  
**Sent:** May-29-18 11:59 AM  
**To:** Daley, Annette; King, Rhea L; Humphrey, Donald  
**Cc:** Lambert, Robert  
**Subject:** Re: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

### **Proposed science conditions:**

A copy of all data collected during the marine science research activities that are the subject of this consent letter is to be sent by email to the following email address, and should include 'IGR-351: US MSR Request OCEARCH (Sep 1 – Oct 31 2018)' in the subject line:

Shark.mar@dfo-mpo.gc.ca

A copy of the final report produced that incorporates information obtained from the marine scientific research that is the subject of this application is to be sent no later than two (2) years after the end date of the timeframe specified in this consent letter to the following address:

Alain Vézina

Regional Director, Science

Maritimes Region

Fisheries and Oceans Canada

Bedford Institute of Oceanography

1 Challenger Drive

Dartmouth, NS B2Y 4A2

**From:** Vézina, Alain  
**Se**

Sent from my BlackBerry 10 smartphone on the Rogers network.

---

**From:** Vézina, Alain  
**Sent:** Monday, May 28, 2018 17:09  
**To:** Daley, Annette; King, Rhea L; Humphrey, Donald  
**Cc:** Lambert, Robert  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

That is good. I am trying to finalize a couple of conditions for Science but these below will take care of most of the serious concerns.

**From:** Daley, Annette  
**Sent:** May 28, 2018 4:22 PM  
**To:** Vézina, Alain <Alain.Vezina@dfo-mpo.gc.ca>; King, Rhea L <Rhea.King@dfo-mpo.gc.ca>; Humphrey, Donald <Donald.Humphrey@dfo-mpo.gc.ca>  
**Cc:** Lambert, Robert <Robert.Lambert@dfo-mpo.gc.ca>  
**Subject:** FYI: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

**From:** MacDonald, Carl  
**Sent:** Monday, May 28, 2018 9:58 AM  
**To:** Daley, Annette <Annette.Daley@dfo-mpo.gc.ca>; Berthier, Jacinta <Jacinta.Berthier@dfo-mpo.gc.ca>  
**Cc:** Docherty, Verna <Verna.Docherty@dfo-mpo.gc.ca>; Licence Maritimes / Permis Maritimes (DFO/MPO) <RegionalLicensing.XMAR@dfo-mpo.gc.ca>  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)


Hi Annette and Jacinta,

For your consideration

DFO Requests the proponent to specify the shark species intended for this research. Currently the proponent only indicates Shark Species - including White Shark. Proponent is to list all species (sharks) they are conducting research on. When we know all the species – a condition can be added to specify these are the only shark species authorized to conduct research on.

Conditions

- Marine mammal parts may not be offered to sharks for feeding or consumption, will not be ingested by sharks, and pieces of marine mammal tissue will not be thrown overboard to attract sharks.
- Efforts to lure, capture, or tag sharks will not occur in close proximity (within two nautical miles) of endangered whale species, including North Atlantic Right Whales (*Eubalaena glacialis*).
- This licence does not authorize research in the area of Mahone Bay, Nova Scotia.

- 
- The licence holder may be required to have an observer (at-sea) on board the vessel during any trip. When required to take an at-sea observer, the licence holder shall not depart from port until the at-sea observer is on board.

Regards,

Carl MacDonald  
Resource Management

Fisheries & Oceans Canada | Government of Canada  
[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca) | Tel: 902-293-8257 | Fax: 902-426-7967

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[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca) | Tél: 902-293-8257 | Télécopieur: 902-426-7967

---

**From:** Daley, Annette  
**Sent:** 2018-May-28 8:54 AM  
**To:** Licence Maritimes / Permis Maritimes (DFO/MPO)  
**Cc:** Berthier, Jacinta; Docherty, Verna; MacDonald, Carl  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Charlene, when RM completes the boxes in the form and add any conditions as Science has, the completed form should be sent around for sign off by RDs, before going to the RDG. Thx

*Annette*

**From:** Vézina, Alain  
**Sent:** Monday, May 28, 2018 7:08 AM  
**To:** Daley, Annette <[Annette.Daley@dfo-mpo.gc.ca](mailto:Annette.Daley@dfo-mpo.gc.ca)>  
**Cc:** Berthier, Jacinta <[Jacinta.Berthier@dfo-mpo.gc.ca](mailto:Jacinta.Berthier@dfo-mpo.gc.ca)>; Docherty, Verna <[Verna.Docherty@dfo-mpo.gc.ca](mailto:Verna.Docherty@dfo-mpo.gc.ca)>; MacDonald, Carl <[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca)>; Licence Maritimes / Permis Maritimes (DFO/MPO) <[RegionalLicensing.XMAR@dfo-mpo.gc.ca](mailto:RegionalLicensing.XMAR@dfo-mpo.gc.ca)>; Herbert, Glen <[Glen.Herbert@dfo-mpo.gc.ca](mailto:Glen.Herbert@dfo-mpo.gc.ca)>; Pye, Brad <[Brad.Pye@dfo-mpo.gc.ca](mailto:Brad.Pye@dfo-mpo.gc.ca)>; King, Rhea L <[Rhea.King@dfo-mpo.gc.ca](mailto:Rhea.King@dfo-mpo.gc.ca)>; Lambert, Robert <[Robert.Lambert@dfo-mpo.gc.ca](mailto:Robert.Lambert@dfo-mpo.gc.ca)>  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Thanks Annette,

From Science's perspective, conditions that flow from my concerns are those that are generally applied by coastal states under the UNCLOS MSR guidelines, i.e.

A preliminary report is submitted to <appropriate office in GAC> no later than x months after the end date of the authorized mission.

A copy of all the data collected during the marine scientific research activities is provided to us.

A copy of the final report produced that incorporates information obtained from the marine scientific research is provided to us no later than x years after the end of the mission.

These are the conditions that are imposed on us when we ask for permission to operate in US waters. I have no idea what GAC requires already in their consent letter and if these conditions are included. If they are, fine. If not, this is the minimum we need to do to ensure that we do our due diligence.

**IMPORTANT:** [REDACTED] RM also has some serious questions about use of bait, coordination with Canadian research, etc .... that should be turned into conditions. Also how will we ensure that the observer condition on the SARA permit is met? [REDACTED]

Alain

**From:** Daley, Annette

**Sent:** May 25, 2018 4:33 PM

**To:** Vézina, Alain <[Alain.Vezina@dfo-mpo.gc.ca](mailto:Alain.Vezina@dfo-mpo.gc.ca)>

**Cc:** Berthier, Jacinta <[Jacinta.Berthier@dfo-mpo.gc.ca](mailto:Jacinta.Berthier@dfo-mpo.gc.ca)>; Docherty, Verna <[Verna.Docherty@dfo-mpo.gc.ca](mailto:Verna.Docherty@dfo-mpo.gc.ca)>;

MacDonald, Carl <[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca)>; Licence Maritimes / Permis Maritimes (DFO/MPO)

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King, Rhea L <[Rhea.King@dfo-mpo.gc.ca](mailto:Rhea.King@dfo-mpo.gc.ca)>; Lambert, Robert <[Robert.Lambert@dfo-mpo.gc.ca](mailto:Robert.Lambert@dfo-mpo.gc.ca)>

**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Alain and Rhea - The recommendation has not gone back to Global Affairs so Oearch has not been informed. Therefore we will go back around with the review process and perhaps Alain, there is a section in the form to add conditions that would be required to be met under the RDGs signature if we wanted to go that route rather than denying the application. Apparently NL is authorizing some work in Placentia Bay.

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**Sent:** Wednesday, May 23, 2018 1:37 PM

**To:** MacDonald, Carl <[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca)>; Licence Maritimes / Permis Maritimes (DFO/MPO)

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**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

With respect to the questions on the science section of the approval form:

This research activity will **not** contribute to the Canadian scientific community. Canadian collaborators do not see the benefit of working with Oearch, even though they have contacted all major Atlantic Universities (Dal, Memorial, Acadia etc), DFO (Heather Bowlby, Mark Simpson), non-profits (Grand Manan Seabird and Whale Research), OTN over the last 2 years. As pointed out by Carl, Heather holds a SARA permit and has an equivalent tagging program for white shark (aka duplication of research effort on a single population of an endangered species). The area that Heather works out of is the outside of St. Margret's Bay or immediately adjacent to Mahone Bay. The main tag type they use is optimized for instantaneous geolocation (excellent opportunities for twitter) but gives no information on habitat use – as needed for SARA research questions.

Canadian scientists will **not** have access to the research data. [REDACTED]

Based on this information, I cannot recommend approval at this time. The amended approval form is attached.

Although I did not change the response in the form, I have no record of a previous approval for this organization.

Outside of my purview, but I understand that the SARA permit requires a DFO observer during at least part of their trip. How will that condition be fulfilled?

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**Cc:** Daley, Annette <[Annette.Daley@dfo-mpo.gc.ca](mailto:Annette.Daley@dfo-mpo.gc.ca)>; Berthier, Jacinta <[Jacinta.Berthier@dfo-mpo.gc.ca](mailto:Jacinta.Berthier@dfo-mpo.gc.ca)>

**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Questions/Comments Regarding Proposed Research:

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- It is important to note that Canadian shark researcher (Heather Bowlby) has been approved to conducted research on the same species (White Shark) in the same area (Mahone Bay).

Regards,

Carl MacDonald  
Resource Management  
Fisheries & Oceans Canada | Government of Canada  
[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca) | Tel: 902-293-8257 | Fax: 902-426-7967

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---

**From:** MacDonald, Carl

**Sent:** 2018-May-22 4:06 PM

**To:** Licence Maritimes / Permis Maritimes (DFO/MPO); Vézina, Alain; Herbert, Glen; Pye, Brad

**Cc:** Daley, Annette

**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Large Pelagic Comments:

1. *Large pelagic sector.* Pelagic longline fishing takes place along the edge of the Scotian Shelf where the large pelagic fleet conducts operations. Caution must be taken to ensure that the scientific research vessel does not cross previously deployed pelagic longlines which run near the surface for distances of 30 - 40 nm. Damaged gear and identifying marks are to be reported to DFO ([Brad.Pye@dfo-mpo.gc.ca](mailto:Brad.Pye@dfo-mpo.gc.ca)) immediately. Vessel is to continuously broadcast an AIS signal.
- Swordfish longline gear may be in other areas.

- Pelagic Longline Gear have AIS beacons attached.
- Beacons from a licence holder have the same vessel prefix on each beacon [REDACTED]
- There will be a string of beacons on a line. It is not possible to travel between the beacons with the research vessel.
- It is possible to travel a suitable distance alongside a pelagic longline set.

Regards,

Carl MacDonald  
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Fisheries & Oceans Canada | Government of Canada  
[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca) | Tel: 902-293-8257 | Fax: 902-426-7967

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**From:** Licence Maritimes / Permis Maritimes (DFO/MPO)  
**Sent:** 2018-May-18 10:24 AM  
**To:** Vézina, Alain; Herbert, Glen; Pye, Brad; MacDonald, Carl  
**Cc:** Daley, Annette  
**Subject:** FW: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)  
**Importance:** High

Good morning – the response time has been changed to **June 1<sup>st</sup>** instead of the original August 1<sup>st</sup> request.

Please review and provide comments/approval for the attached Foreign Vessel Cruise for Scientific Research (Shark species including White Shark).

I have asked NCR to have the applicant provide us with a Map of the Area to be studied, as the areas are only recorded under section 3 of the application. Placentia Bay, Nfld is listed, but as we do not licence vessels for other waters, I will notify Nfld licensing that this application will be reviewed and no doubt, approved for our waters. If Nfld requests that Placentia Bay be included, we will do that.

Thanks and have a nice day!

Charlene Cleveland  
Regional Officer, Licensing Services  
Dept of Fisheries & Oceans  
Dartmouth, Nova Scotia  
Tel: (902) 426-9966  
Fax: (902) 426-5010  
[Licence.maritimes.permis@dfo-mpo.gc.ca](mailto:Licence.maritimes.permis@dfo-mpo.gc.ca)

---

**From:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO)  
**Sent:** 2017-November-30 1:14 PM  
**To:** Licence Maritimes / Permis Maritimes (DFO/MPO); Duggan, Charmaine; Kean, Jackie; Bowdring, Tony

**Cc:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO); Lavigne, Élise; Farr, Connie; Chmiel, Jim;  
[HlxEcareg1@innav.gc.ca](mailto:HlxEcareg1@innav.gc.ca)

**Subject:** IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Good afternoon,

Please see attached US Marine Scientific Research (MSR) request for the **OCEARCH, Sep 1 – Oct 31, 2018**. It appears as though the proponent intends to conduct work in both Newfoundland and Maritimes Regions (though primarily in Maritimes).

The vessel intends to call on Halifax, NS, between **Sep 9 – Oct 31, 2018**, for provisioning.

We kindly request all responses by **August 1, 2018**.

Best wishes,

Andrew

**Cleveland, Charlene**

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**From:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO)  
**Sent:** 2018-May-30 2:51 PM  
**To:** Licence Maritimes / Permis Maritimes (DFO/MPO)  
**Cc:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO)  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Thanks Charlene,

I have forwarded this new request, along with the previous two sets of queries (as a reminder) to Global Affairs for conveyance to the proponent.

Best,

Andrew

---

**From:** Licence Maritimes / Permis Maritimes (DFO/MPO)  
**Sent:** May-30-18 12:36 PM  
**To:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO)  
**Subject:** FW: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)  
**Importance:** High

Good afternoon – as we are still working on revisiting this Foreign Vessel application for the above US vessel - Ocearch, and as per the e-mail below from Carl MacDonald, Senior Resource Manager, please have the applicant provide a **complete list of Shark species** that they will conducting research on. (highlighted in yellow)

The approval process will not move forward until this information is received and well as the previous requests for **additional information** is received (**map of research area and the bait description**)

Regards,

Charlene Cleveland  
Regional Officer, Licensing Services  
Dept of Fisheries & Oceans  
Dartmouth, Nova Scotia  
Tel: (902) 426-9966  
Fax: (902) 426-5010  
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**From:** MacDonald, Carl  
**Sent:** 2018-May-28 9:58 AM  
**To:** Daley, Annette; Berthier, Jacinta  
**Cc:** Docherty, Verna; Licence Maritimes / Permis Maritimes (DFO/MPO)  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Hi Annette and Jacinta,

For your consideration



**DFO Requests the proponent to specify the shark species intended for this research. Currently the proponent only indicates Shark Species - including White Shark. Proponent is to list all species (sharks) they are conducting research on. When we know all the species – a condition can be added to specify these are the only shark species authorized to conduct research on.**

Conditions

- Marine mammal parts may not be offered to sharks for feeding or consumption, will not be ingested by sharks, and pieces of marine mammal tissue will not be thrown overboard to attract sharks.
- Efforts to lure, capture, or tag sharks will not occur in close proximity (within two nautical miles) of endangered whale species, including North Atlantic Right Whales (*Eubalaena glacialis*).
- This licence does not authorize research in the area of Mahone Bay, Nova Scotia.

- The licence holder may be required to have an observer (at-sea) on board the vessel during any trip. When required to take an at-sea observer, the licence holder shall not depart from port until the at-sea observer is on board.

Regards,

Carl MacDonald  
Resource Management  
Fisheries & Oceans Canada | Government of Canada  
[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca) | Tel: 902-293-8257 | Fax: 902-426-7967

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Charlene, when RM completes the boxes in the form and add any conditions as Science has, the completed form should be sent around for sign off by RDs, before going to the RDG. Thx

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Thanks Annette,

From Science's perspective, conditions that flow from my concerns are those that are generally applied by coastal states under the UNCLOS MSR guidelines, i.e.

A preliminary report is submitted to <appropriate office in GAC> no later than x months after the end date of the authorized mission.

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**IMPORTANT:** [REDACTED] RM also has some serious questions about use of bait, coordination with Canadian research, etc .... that should be turned into conditions. Also how will we ensure that the observer condition on the SARA permit is met? [REDACTED]

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mpo.gc.ca>; King, Rhea L <Rhea.King@dfo-mpo.gc.ca>; Lambert, Robert <Robert.Lambert@dfo-mpo.gc.ca>

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**Cc:** Daley, Annette <Annette.Daley@dfo-mpo.gc.ca>; Berthier, Jacinta <Jacinta.Berthier@dfo-mpo.gc.ca>

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Carl MacDonald

Resource Management

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**Cc:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO); Lavigne, Élise; Farr, Connie; Chmiel, Jim;  
[HlxEcareg1@innav.gc.ca](mailto:HlxEcareg1@innav.gc.ca)  
**Subject:** IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Good afternoon,

Please see attached US Marine Scientific Research (MSR) request for the **OCEARCH, Sep 1 – Oct 31, 2018**. It appears as though the proponent intends to conduct work in both Newfoundland and Maritimes Regions (though primarily in Maritimes).

The vessel intends to call on Halifax, NS, between **Sep 9 – Oct 31, 2018**, for provisioning.

We kindly request all responses by **August 1, 2018**.

Best wishes,

Andrew

**MacDonald, Jennifer**

---

**From:** MacDonald, Jennifer  
**Sent:** May-30-18 1:17 PM  
**To:** Humphrey, Donald  
**Subject:** RE: OCEARCH permit  
**Attachments:** Science input to OCEARCH permit reveiw.docx

I went back through my emails and meeting notes and pulled together the attached; let me know if you need anything further.

Jenn

**Jennifer MacDonald**  
Species at Risk Management Division  
(902) 407-8175

---

**From:** Humphrey, Donald  
**Sent:** May-30-18 8:19 AM  
**To:** MacDonald, Jennifer  
**Subject:** Re: OCEARCH permit

This week sometime is ok. Thanks.

Sent from my BlackBerry 10 smartphone on the Rogers network.

---

**From:** MacDonald, Jennifer  
**Sent:** Wednesday, May 30, 2018 8:16 AM  
**To:** Humphrey, Donald  
**Subject:** RE: OCEARCH permit

Will do...I have a few things I'm trying to wrap up this morning, or do you need this right away?

**Jennifer MacDonald**  
Species at Risk Management Division  
(902) 407-8175

---

**From:** Humphrey, Donald  
**Sent:** May-29-18 9:46 PM  
**To:** MacDonald, Jennifer  
**Subject:** OCEARCH permit

Can you pull together a short summary of our interactions with science and input/advice they provided (if any).

Thanks, Donald

### **Science input to OCEARCH SARA Permit Review**

SARMD held two meetings with DFO Science (Heather Bowlby and Warren Joyce):

- December 19, 2017
  - Provided Science copy of the application and the template for the SARA Permit Assessment and Approval Form
  - Discussed questions about the application; additional information that would be required from OCEARCH; Science provided numerous comments on the list of questions sent back to OCEARCH for more information
  - Discussed the Science Advisory document on allowable harm; Science advised that given there is scope for harm, the proposed activities would not jeopardize survival and recovery
  - Science asked about what factors can be considered in the SARA permitting decisions (can we consider the value of the research questions to the species recovery or whether research is duplication of existing DFO Science research)
  - Science indicated that the proposed OCEARCH work would not be considered interference with DFO Science research,
  - [REDACTED]
- February 6, 2018
  - Provided Science a draft of the Assessment and Approval Form and a document proposing preliminary conditions to include in a permit (did not receive written comments on any versions of the Assessment and Approval Form sent to Science)
  - Discussed various methodologies that are used worldwide to tag White Sharks (capturing and removing from the water, capturing and tagging while in the water or tagging free-swimming sharks); capturing the shark likely increases the success of tagging; this has to be balanced with the increasing amount of handling and potential for stress/longer term behavioral impacts.
  - Science advised that other researchers are using a methodology where White Sharks are caught, but kept in the water alongside the boat while SPOT tags are attached. While it is difficult to tease apart potential behavioral impacts due to specific parts of the process (the catching, the lifting from the water, the attachment of tags), Science suggested keeping sharks in the water at least keeps the animal in its natural environment.
  - In terms of mitigation, Warren advised that he reviewed the methodology proposed by OCEARCH (hook type, gear type, etc.) and would advise that this is sufficient mitigation.

### **Other input**

- SARMD drafted a document outlining alternatives (capturing and removing from the water, capturing and tagging while in the water or tagging free-swimming sharks) and the various tagging and sampling that can be conducted under each methodology; received input from Science on the document.
- Science provided SARMD with numerous research publications on sharks, tagging, post-release behaviour, etc.
- Science advised including a condition setting a minimum size for White Sharks to be tagged and provided the size information.

## Cleveland, Charlene

---

**From:** Herbert, Glen  
**Sent:** 2018-May-31 3:54 PM  
**To:** Cleveland, Charlene; Docherty, Verna; MacDonald, Carl; Vézina, Alain; Pye, Brad  
**Cc:** Berthier, Jacinta; Daley, Annette  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Ecosystem Management approves with conditions as is, and noting a SARA permit is in place.

---

Glen Herbert  
Regional Manager  
Oceans and Coastal Management Division  
Ecosystem Management Branch  
Fisheries and Oceans Canada – Maritimes Region  
Bedford Institute of Oceanography  
1 Challenger Dr., PO Box 1006  
5th Floor, Polaris Bldg.  
Dartmouth, NS, B2Y 4A2  
Tel: (902) 802 7051  
Email: [glen.herbert@dfo-mpo.gc.ca](mailto:glen.herbert@dfo-mpo.gc.ca)

---

**From:** Cleveland, Charlene  
**Sent:** May-28-18 2:21 PM  
**To:** Docherty, Verna; MacDonald, Carl; Vézina, Alain; Pye, Brad; Herbert, Glen  
**Cc:** Berthier, Jacinta; Daley, Annette  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

As per Verna's e-mail, please find attached the draft version of the Foreign Fishing Vessel Licence Approval form for the OCEARCH. I have added the comments and/or conditions provided to date. The attached email and Schedule 38 from Erin Dunne, NL Region, will be attached to the licence prior to issuance. Please change or add to the document, as necessary.

Please feel free to contact me should you have questions.

Charlene Cleveland  
Licensing Officer  
Martimes Region – Dartmouth  
Phone: 902-426-1929  
[Charlene.cleveland@dfo-mpo.gc.ca](mailto:Charlene.cleveland@dfo-mpo.gc.ca)

---

**From:** Docherty, Verna  
**Sent:** 2018-May-28 2:10 PM  
**To:** Cleveland, Charlene; MacDonald, Carl; Vézina, Alain; Pye, Brad; Herbert, Glen  
**Cc:** Berthier, Jacinta; Licence Maritimes / Permis Maritimes (DFO/MPO); Daley, Annette  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Good afternoon all.



By copy of this email, I'll ask Charlene to recirculate the Foreign Fishing Vessel Licence Approval form to all to review their original input. If there are concerns that can be addressed by the addition of conditions of licence, please provide the exact wording that you would like to have included, including specifics on reporting timelines, addresses to submit reports, etc.

I note that RM (Carl) has a question on the shark species that are the subject of the research. If there are additional questions, please let Licensing know ASAP so we can coordinate our communications with the proponent.

As always, if you have any questions for me, I'm happy to discuss.

Kind regards,  
Verna

**From:** Vézina, Alain  
**Sent:** Monday, May 28, 2018 7:08 AM  
**To:** Daley, Annette <Annette.Daley@dfo-mpo.gc.ca>  
**Cc:** Berthier, Jacinta <Jacinta.Berthier@dfo-mpo.gc.ca>; Docherty, Verna <Verna.Docherty@dfo-mpo.gc.ca>; MacDonald, Carl <Carl.MacDonald@dfo-mpo.gc.ca>; Licence Maritimes / Permis Maritimes (DFO/MPO) <RegionalLicensing.XMAR@dfo-mpo.gc.ca>; Herbert, Glen <Glen.Herbert@dfo-mpo.gc.ca>; Pye, Brad <Brad.Pye@dfo-mpo.gc.ca>; King, Rhea L <Rhea.King@dfo-mpo.gc.ca>; Lambert, Robert <Robert.Lambert@dfo-mpo.gc.ca>  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Thanks Annette,

From Science's perspective, conditions that flow from my concerns are those that are generally applied by coastal states under the UNCLOS MSR guidelines, i.e.

A preliminary report is submitted to <appropriate office in GAC> no later than x months after the end date of the authorized mission.

A copy of all the data collected during the marine scientific research activities is provided to us.

A copy of the final report produced that incorporates information obtained from the marine scientific research is provided to us no later than x years after the end of the mission.

These are the conditions that are imposed on us when we ask for permission to operate in US waters. I have no idea what GAC requires already in their consent letter and if these conditions are included. If they are, fine. If not, this is the minimum we need to do to ensure that we do our due diligence.

**IMPORTANT:** [REDACTED] RM also has some serious questions about use of bait, coordination with Canadian research, etc .... that should be turned into conditions. Also how will we ensure that the observer condition on the SARA permit is met? [REDACTED]

Alain

**From:** Daley, Annette  
**Sent:** May 25, 2018 4:33 PM  
**To:** Vézina, Alain <Alain.Vezina@dfo-mpo.gc.ca>  
**Cc:** Berthier, Jacinta <Jacinta.Berthier@dfo-mpo.gc.ca>; Docherty, Verna <Verna.Docherty@dfo-mpo.gc.ca>; MacDonald, Carl <Carl.MacDonald@dfo-mpo.gc.ca>; Licence Maritimes / Permis Maritimes (DFO/MPO) <RegionalLicensing.XMAR@dfo-mpo.gc.ca>; Herbert, Glen <Glen.Herbert@dfo-mpo.gc.ca>; Pye, Brad <Brad.Pye@dfo-mpo.gc.ca>; King, Rhea L <Rhea.King@dfo-mpo.gc.ca>; Lambert, Robert <Robert.Lambert@dfo-mpo.gc.ca>  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Alain and Rhea - The recommendation has not gone back to Global Affairs so Ocearch has not been informed. Therefore we will go back around with the review process and perhaps Alain, there is a section in the form to add conditions that would be required to be met under the RDGs signature if we wanted to go that route rather than denying the application. Apparently NL is authorizing some work in Placentia Bay.

*Annette*

**From:** Vézina, Alain  
**Sent:** Wednesday, May 23, 2018 1:37 PM  
**To:** MacDonald, Carl <Carl.MacDonald@dfo-mpo.gc.ca>; Licence Maritimes / Permis Maritimes (DFO/MPO) <RegionalLicensing.XMAR@dfo-mpo.gc.ca>; Herbert, Glen <Glen.Herbert@dfo-mpo.gc.ca>; Pye, Brad <Brad.Pye@dfo-mpo.gc.ca>  
**Cc:** Daley, Annette <Annette.Daley@dfo-mpo.gc.ca>; Berthier, Jacinta <Jacinta.Berthier@dfo-mpo.gc.ca>  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

With respect to the questions on the science section of the approval form:

This research activity will **not** contribute to the Canadian scientific community. Canadian collaborators do not see the benefit of working with Ocearch, even though they have contacted all major Atlantic Universities (Dal, Memorial, Acadia etc), DFO (Heather Bowlby, Mark Simpson), non-profits (Grand Manan Seabird and Whale Research), OTN over the last 2 years. As pointed out by Carl, Heather holds a SARA permit and has an equivalent tagging program for white shark (aka duplication of research effort on a single population of an endangered species). The area that Heather works out of is the outside of St. Margret's Bay or immediately adjacent to Mahone Bay. The main tag type they use is optimized for instantaneous geolocation (excellent opportunities for twitter) but gives no information on habitat use – as needed for SARA research questions.

Canadian scientists will **not** have access to the research data. [REDACTED]

Based on this information, I cannot recommend approval at this time. The amended approval form is attached.

Although I did not change the response in the form, I have no record of a previous approval for this organization.

Outside of my purview, but I understand that the SARA permit requires a DFO observer during at least part of their trip. How will that condition be fulfilled?

Alain

**From:** MacDonald, Carl  
**Sent:** May 23, 2018 10:32 AM  
**To:** Licence Maritimes / Permis Maritimes (DFO/MPO) <RegionalLicensing.XMAR@dfo-mpo.gc.ca>; Vézina, Alain <Alain.Vezina@dfo-mpo.gc.ca>; Herbert, Glen <Glen.Herbert@dfo-mpo.gc.ca>; Pye, Brad <Brad.Pye@dfo-mpo.gc.ca>  
**Cc:** Daley, Annette <Annette.Daley@dfo-mpo.gc.ca>; Berthier, Jacinta <Jacinta.Berthier@dfo-mpo.gc.ca>  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Questions/Comments Regarding Proposed Research:

- Would it be possible for the researcher to describe the bait type they propose to use? ie Will the researcher be using Marine Mammal parts for Bait? If so, where will this Marine Mammal bait be acquired?
- Would it be possible for the researcher to be more specific regarding the shark species intended for this research? Currently the document only indicates Shark Species - including White Shark.
- It is important to note that Canadian shark researcher (Heather Bowiby) has been approved to conducted research on the same species (White Shark) in the same area (Mahone Bay).

Regards,

Carl MacDonald  
Resource Management  
Fisheries & Oceans Canada | Government of Canada  
[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca) | Tel: 902-293-8257 | Fax: 902-426-7967

Regional agent principal de gestion des peches, Gestion des ressources  
Pêches et Océans Canada | Gouvernement du Canada  
[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca) | Tél: 902-293-8257 | Télécopieur: 902-426-7967

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**From:** MacDonald, Carl  
**Sent:** 2018-May-22 4:06 PM  
**To:** Licence Maritimes / Permis Maritimes (DFO/MPO); Vézina, Alain; Herbert, Glen; Pye, Brad  
**Cc:** Daley, Annette  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Large Pelagic Comments:

1. *Large pelagic sector.* Pelagic longline fishing takes place along the edge of the Scotian Shelf where the large pelagic fleet conducts operations. Caution must be taken to ensure that the scientific research vessel does not cross previously deployed pelagic longlines which run near the surface for distances of 30 - 40 nm. Damaged gear and identifying marks are to be reported to DFO ([Brad.Pye@dfo-mpo.gc.ca](mailto:Brad.Pye@dfo-mpo.gc.ca)) immediately. Vessel is to continuously broadcast an AIS signal.
  - Swordfish longline gear may be in other areas.
  - Pelagic Longline Gear have AIS beacons attached.
  - Beacons from a licence holder have the same vessel prefix on each beacon
  - There will be a string of beacons on a line. It is not possible to travel between the beacons with the research vessel.
  - It is possible to travel a suitable distance alongside a pelagic longline set.

Regards,

Carl MacDonald  
Resource Management  
Fisheries & Oceans Canada | Government of Canada  
[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca) | Tel: 902-293-8257 | Fax: 902-426-7967

---

**From:** Licence Maritimes / Permis Maritimes (DFO/MPO)  
**Sent:** 2018-May-18 10:24 AM  
**To:** Vézina, Alain; Herbert, Glen; Pye, Brad; MacDonald, Carl  
**Cc:** Daley, Annette  
**Subject:** FW: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)  
**Importance:** High

Good morning – the response time has been changed to **June 1<sup>st</sup>** instead of the original **August 1<sup>st</sup>** request.

Please review and provide comments/approval for the attached Foreign Vessel Cruise for Scientific Research (Shark species including White Shark).

I have asked NCR to have the applicant provide us with a Map of the Area to be studied, as the areas are only recorded under section 3 of the application. Placentia Bay, Nfld is listed, but as we do not licence vessels for other waters, I will notify Nfld licensing that this application will be reviewed and no doubt, approved for our waters. If Nfld requests that Placentia Bay be included, we will do that.

Thanks and have a nice day!

Charlene Cleveland  
Regional Officer, Licensing Services  
Dept of Fisheries & Oceans  
Dartmouth, Nova Scotia  
Tel: (902) 426-9966  
Fax: (902) 426-5010  
[Licence.maritimes.permis@dfo-mpo.gc.ca](mailto:Licence.maritimes.permis@dfo-mpo.gc.ca)

---

**From:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO)  
**Sent:** 2017–November-30 1:14 PM  
**To:** Licence Maritimes / Permis Maritimes (DFO/MPO); Duggan, Charmaine; Kean, Jackie; Bowdring, Tony  
**Cc:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO); Lavigne, Élise; Farr, Connie; Chmiel, Jim;  
[HlxEcareg1@innav.gc.ca](mailto:HlxEcareg1@innav.gc.ca)  
**Subject:** IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Good afternoon,

Please see attached US Marine Scientific Research (MSR) request for the **OCEARCH, Sep 1 – Oct 31, 2018**. It appears as though the proponent intends to conduct work in both Newfoundland and Maritimes Regions (though primarily in Maritimes).

The vessel intends to call on Halifax, NS, between **Sep 9 – Oct 31, 2018**, for provisioning.

We kindly request all responses by **August 1, 2018**.

Best wishes,

Andrew

No information has been removed or severed from this page

## Cleveland, Charlene

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**From:** Cleveland, Charlene  
**Sent:** 2018-June-01 9:39 AM  
**To:** Docherty, Verna  
**Subject:** FW: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018) - FFVLAF Updated June 1, 2018  
**Attachments:** Ocearch - September 1 to October 31, 2018 (Final).doc; Schedule 38 FINAL - Nfld Region.docx  
**Importance:** High

Good morning Verna – as per the attached e-mail chain and the initial approvals received from the branch directors, I have updated the final draft of the Foreign Fishing Vessel Licence Approval form for the US vessel OCEARCH.

Please review to ensure that all requested conditions are included in the approval form. If you are happy with this draft, I can then prepare the folder for circulation and approval to the RD and the RDG.

Once the application is approved, I will included these specific conditions in the Foreign Vessel Licence.

Please advise – thanks!

Charlene Cleveland  
Licensing Officer  
Martimes Region – Dartmouth  
Phone: 902-426-1929  
[Charlene.cleveland@dfo-mpo.gc.ca](mailto:Charlene.cleveland@dfo-mpo.gc.ca)

---

**From:** Daley, Annette  
**Sent:** 2018-May-29 12:10 PM  
**To:** Docherty, Verna; Licence Maritimes / Permis Maritimes (DFO/MPO)  
**Cc:** Berthier, Jacinta  
**Subject:** Fw: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018) (done ADDED to FFVLAF)

Pls see below.

Annette Daley  
A/Regional Director, Fisheries Management  
Fisheries and Oceans Canada | Government of Canada  
[Annette.Daley@dfo-mpo.gc.ca](mailto:Annette.Daley@dfo-mpo.gc.ca) |  
Telephone: 902-426-9962 | Facsimile: 902-426-7967

Directrice régionale par interim, Gestion des pêches  
Pêches et Océans Canada | Gouvernement du Canada  
[Annette.Daley@dfo-mpo.gc.ca](mailto:Annette.Daley@dfo-mpo.gc.ca) |  
Téléphone: 902-426-9962 | Télécopieur: 902-426-7967

---

**From:** Vézina, Alain <Alain.Vezina@dfo-mpo.gc.ca>  
**Sent:** Tuesday, May 29, 2018 11:59 AM  
**To:** Daley, Annette; King, Rhea L; Humphrey, Donald  
**Cc:** Lambert, Robert  
**Subject:** Re: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

**Proposed science conditions:**

A copy of all data collected during the marine science research activities that are the subject of this consent letter is to be sent by email to the following email address, and should include 'IGR-351: US MSR Request OCEARCH (Sep 1 – Oct 31 2018)' in the subject line:

Shark.mar@dfo-mpo.gc.ca

A copy of the final report produced that incorporates information obtained from the marine scientific research that is the subject of this application is to be sent no later than two (2) years after the end date of the timeframe specified in this consent letter to the following address:

Alain Vézina

Regional Director, Science

Maritimes Region

Fisheries and Oceans Canada

Bedford Institute of Oceanography

1 Challenger Drive

Dartmouth, NS B2Y 4A2

**From:** Vézina, Alain  
**Se**

Sent from my BlackBerry 10 smartphone on the Rogers network.

---

**From:** Vézina, Alain  
**Sent:** Monday, May 28, 2018 17:09

**To:** Daley, Annette; King, Rhea L; Humphrey, Donald  
**Cc:** Lambert, Robert  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

That is good. I am trying to finalize a couple of conditions for Science but these below will take care of most of the serious concerns.

**From:** Daley, Annette  
**Sent:** May 28, 2018 4:22 PM  
**To:** Vézina, Alain <Alain.Vezina@dfo-mpo.gc.ca>; King, Rhea L <Rhea.King@dfo-mpo.gc.ca>; Humphrey, Donald <Donald.Humphrey@dfo-mpo.gc.ca>  
**Cc:** Lambert, Robert <Robert.Lambert@dfo-mpo.gc.ca>  
**Subject:** FYI: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

**From:** MacDonald, Carl  
**Sent:** Monday, May 28, 2018 9:58 AM  
**To:** Daley, Annette <Annette.Daley@dfo-mpo.gc.ca>; Berthier, Jacinta <Jacinta.Berthier@dfo-mpo.gc.ca>  
**Cc:** Docherty, Verna <Verna.Docherty@dfo-mpo.gc.ca>; Licence Maritimes / Permis Maritimes (DFO/MPO) <RegionalLicensing.XMAR@dfo-mpo.gc.ca>  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Hi Annette and Jacinta,

For your consideration

DFO Requests the proponent to specify the shark species intended for this research. Currently the proponent only indicates Shark Species - including White Shark. Proponent is to list all species (sharks) they are conducting research on. When we know all the species – a condition can be added to specify these are the only shark species authorized to conduct research on.

#### Conditions

- Marine mammal parts may not be offered to sharks for feeding or consumption, will not be ingested by sharks, and pieces of marine mammal tissue will not be thrown overboard to attract sharks.
- Efforts to lure, capture, or tag sharks will not occur in close proximity (within two nautical miles) of endangered whale species, including North Atlantic Right Whales (*Eubalaena glacialis*).
- This licence does not authorize research in the area of Mahone Bay, Nova Scotia.

- The licence holder may be required to have an observer (at-sea) on board the vessel during any trip. When required to take an at-sea observer, the licence holder shall not depart from port until the at-sea observer is on board.

Regards,

Carl MacDonald  
 Resource Management  
 Fisheries & Oceans Canada | Government of Canada  
[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca) | Tel: 902-293-8257 | Fax: 902-426-7967



Regional agent principal de gestion des peches, Gestion des ressources  
 Pêches et Océans Canada | Gouvernement du Canada  
[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca) | Tél: 902-293-8257 | Télécopieur: 902-426-7967

---

**From:** Daley, Annette  
**Sent:** 2018-May-28 8:54 AM  
**To:** Licence Maritimes / Permis Maritimes (DFO/MPO)  
**Cc:** Berthier, Jacinta; Docherty, Verna; MacDonald, Carl  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Charlene, when RM completes the boxes in the form and add any conditions as Science has, the completed form should be sent around for sign off by RDs, before going to the RDG. Thx

*Annette*

---

**From:** Vézina, Alain  
**Sent:** Monday, May 28, 2018 7:08 AM  
**To:** Daley, Annette <[Annette.Daley@dfo-mpo.gc.ca](mailto:Annette.Daley@dfo-mpo.gc.ca)>  
**Cc:** Berthier, Jacinta <[Jacinta.Berthier@dfo-mpo.gc.ca](mailto:Jacinta.Berthier@dfo-mpo.gc.ca)>; Docherty, Verna <[Verna.Docherty@dfo-mpo.gc.ca](mailto:Verna.Docherty@dfo-mpo.gc.ca)>; MacDonald, Carl <[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca)>; Licence Maritimes / Permis Maritimes (DFO/MPO) <[RegionalLicensing.XMAR@dfo-mpo.gc.ca](mailto:RegionalLicensing.XMAR@dfo-mpo.gc.ca)>; Herbert, Glen <[Glen.Herbert@dfo-mpo.gc.ca](mailto:Glen.Herbert@dfo-mpo.gc.ca)>; Pye, Brad <[Brad.Pye@dfo-mpo.gc.ca](mailto:Brad.Pye@dfo-mpo.gc.ca)>; King, Rhea L <[Rhea.King@dfo-mpo.gc.ca](mailto:Rhea.King@dfo-mpo.gc.ca)>; Lambert, Robert <[Robert.Lambert@dfo-mpo.gc.ca](mailto:Robert.Lambert@dfo-mpo.gc.ca)>  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Thanks Annette,

From Science's perspective, conditions that flow from my concerns are those that are generally applied by coastal states under the UNCLOS MSR guidelines, i.e.

A preliminary report is submitted to <appropriate office in GAC> no later than x months after the end date of the authorized mission.

A copy of all the data collected during the marine scientific research activities is provided to us.

A copy of the final report produced that incorporates information obtained from the marine scientific research is provided to us no later than x years after the end of the mission.

These are the conditions that are imposed on us when we ask for permission to operate in US waters. I have no idea what GAC requires already in their consent letter and if these conditions are included. If they are, fine. If not, this is the minimum we need to do to ensure that we do our due diligence.

**IMPORTANT:** [REDACTED] RM also has some serious questions about use of bait, coordination with Canadian research, etc .... that should be turned into conditions. Also how will we ensure that the observer condition on the SARA permit is met? [REDACTED]

Alain

**From:** Daley, Annette  
**Sent:** May 25, 2018 4:33 PM  
**To:** Vézina, Alain <[Alain.Vezina@dfo-mpo.gc.ca](mailto:Alain.Vezina@dfo-mpo.gc.ca)>  
**Cc:** Berthier, Jacinta <[Jacinta.Berthier@dfo-mpo.gc.ca](mailto:Jacinta.Berthier@dfo-mpo.gc.ca)>; Docherty, Verna <[Verna.Docherty@dfo-mpo.gc.ca](mailto:Verna.Docherty@dfo-mpo.gc.ca)>; MacDonald, Carl <[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca)>; Licence Maritimes / Permis Maritimes (DFO/MPO) <[RegionalLicensing.XMAR@dfo-mpo.gc.ca](mailto:RegionalLicensing.XMAR@dfo-mpo.gc.ca)>; Herbert, Glen <[Glen.Herbert@dfo-mpo.gc.ca](mailto:Glen.Herbert@dfo-mpo.gc.ca)>; Pye, Brad <[Brad.Pye@dfo-mpo.gc.ca](mailto:Brad.Pye@dfo-mpo.gc.ca)>; King, Rhea L <[Rhea.King@dfo-mpo.gc.ca](mailto:Rhea.King@dfo-mpo.gc.ca)>; Lambert, Robert <[Robert.Lambert@dfo-mpo.gc.ca](mailto:Robert.Lambert@dfo-mpo.gc.ca)>  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Alain and Rhea - The recommendation has not gone back to Global Affairs so Ocearch has not been informed. Therefore we will go back around with the review process and perhaps Alain, there is a section in the form to add conditions that would be required to be met under the RDGs signature if we wanted to go that route rather than denying the application. Apparently NL is authorizing some work in Placentia Bay.

*Annette*

**From:** Vézina, Alain  
**Sent:** Wednesday, May 23, 2018 1:37 PM  
**To:** MacDonald, Carl <[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca)>; Licence Maritimes / Permis Maritimes (DFO/MPO) <[RegionalLicensing.XMAR@dfo-mpo.gc.ca](mailto:RegionalLicensing.XMAR@dfo-mpo.gc.ca)>; Herbert, Glen <[Glen.Herbert@dfo-mpo.gc.ca](mailto:Glen.Herbert@dfo-mpo.gc.ca)>; Pye, Brad <[Brad.Pye@dfo-mpo.gc.ca](mailto:Brad.Pye@dfo-mpo.gc.ca)>  
**Cc:** Daley, Annette <[Annette.Daley@dfo-mpo.gc.ca](mailto:Annette.Daley@dfo-mpo.gc.ca)>; Berthier, Jacinta <[Jacinta.Berthier@dfo-mpo.gc.ca](mailto:Jacinta.Berthier@dfo-mpo.gc.ca)>  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

With respect to the questions on the science section of the approval form:

This research activity will **not** contribute to the Canadian scientific community. Canadian collaborators do not see the benefit of working with Ocearch, even though they have contacted all major Atlantic Universities (Dal, Memorial, Acadia etc), DFO (Heather Bowlby, Mark Simpson), non-profits (Grand Manan Seabird and Whale Research), OTN over the last 2 years. As pointed out by Carl, Heather holds a SARA permit and has an equivalent tagging program for white shark (aka duplication of research effort on a single population of an endangered species). The area that Heather works out of is the outside of St. Margret's Bay or immediately adjacent to Mahone Bay. The main tag type they use is optimized for instantaneous geolocation (excellent opportunities for twitter) but gives no information on habitat use – as needed for SARA research questions.

Canadian scientists will **not** have access to the research data.

Based on this information, I cannot recommend approval at this time. The amended approval form is attached.

Although I did not change the response in the form, I have no record of a previous approval for this organization.

Outside of my purview, but I understand that the SARA permit requires a DFO observer during at least part of their trip. How will that condition be fulfilled?

Alain

**From:** MacDonald, Carl

**Sent:** May 23, 2018 10:32 AM

**To:** Licence Maritimes / Permis Maritimes (DFO/MPO) <[RegionalLicensing.XMAR@dfo-mpo.gc.ca](mailto:RegionalLicensing.XMAR@dfo-mpo.gc.ca)>; Vézina, Alain <[Alain.Vezina@dfo-mpo.gc.ca](mailto:Alain.Vezina@dfo-mpo.gc.ca)>; Herbert, Glen <[Glen.Herbert@dfo-mpo.gc.ca](mailto:Glen.Herbert@dfo-mpo.gc.ca)>; Pye, Brad <[Brad.Pye@dfo-mpo.gc.ca](mailto:Brad.Pye@dfo-mpo.gc.ca)>

**Cc:** Daley, Annette <[Annette.Daley@dfo-mpo.gc.ca](mailto:Annette.Daley@dfo-mpo.gc.ca)>; Berthier, Jacinta <[Jacinta.Berthier@dfo-mpo.gc.ca](mailto:Jacinta.Berthier@dfo-mpo.gc.ca)>

**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

**Questions/Comments Regarding Proposed Research:**

- Would it be possible for the researcher to describe the bait type they propose to use? ie Will the researcher be using Marine Mammal parts for Bait? If so, where will this Marine Mammal bait be acquired?
- Would it be possible for the researcher to be more specific regarding the shark species intended for this research? Currently the document only indicates Shark Species - including White Shark.
- It is important to note that Canadian shark researcher (Heather Bowlby) has been approved to conducted research on the same species (White Shark) in the same area (Mahone Bay).

Regards,

Carl MacDonald  
Resource Management  
Fisheries & Oceans Canada | Government of Canada  
[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca) | Tel: 902-293-8257 | Fax: 902-426-7967

Regional agent principal de gestion des peches, Gestion des ressources  
Pêches et Océans Canada | Gouvernement du Canada  
[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca) | Tél: 902-293-8257 | Télécopieur: 902-426-7967

---

**From:** MacDonald, Carl

**Sent:** 2018-May-22 4:06 PM

**To:** Licence Maritimes / Permis Maritimes (DFO/MPO); Vézina, Alain; Herbert, Glen; Pye, Brad

**Cc:** Daley, Annette

**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

**Large Pelagic Comments:**

1. *Large pelagic sector.* Pelagic longline fishing takes place along the edge of the Scotian Shelf where the large pelagic fleet conducts operations. Caution must be taken to ensure that the scientific research vessel does not cross previously deployed pelagic longlines which run near the surface for distances of 30 - 40 nm. Damaged gear and identifying marks are to be reported to DFO ([Brad.Pye@dfo-mpo.gc.ca](mailto:Brad.Pye@dfo-mpo.gc.ca)) immediately. Vessel is to continuously broadcast an AIS signal.
  - Swordfish longline gear may be in other areas.
  - Pelagic Longline Gear have AIS beacons attached.
  - Beacons from a licence holder have the same vessel prefix on each beacon

- There will be a string of beacons on a line. It is not possible to travel between the beacons with the research vessel.
- It is possible to travel a suitable distance alongside a pelagic longline set.

Regards,

Carl MacDonald  
Resource Management  
Fisheries & Oceans Canada | Government of Canada  
[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca) | Tel: 902-293-8257 | Fax: 902-426-7967

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---

**From:** Licence Maritimes / Permis Maritimes (DFO/MPO)  
**Sent:** 2018-May-18 10:24 AM  
**To:** Vézina, Alain; Herbert, Glen; Pye, Brad; MacDonald, Carl  
**Cc:** Daley, Annette  
**Subject:** FW: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)  
**Importance:** High

Good morning – the response time has been changed to **June 1<sup>st</sup>** instead of the original **August 1<sup>st</sup>** request.

Please review and provide comments/approval for the attached Foreign Vessel Cruise for Scientific Research (Shark species including White Shark).

I have asked NCR to have the applicant provide us with a Map of the Area to be studied, as the areas are only recorded under section 3 of the application. Placentia Bay, Nfld is listed, but as we do not licence vessels for other waters, I will notify Nfld licensing that this application will be reviewed and no doubt, approved for our waters. If Nfld requests that Placentia Bay be included, we will do that.

Thanks and have a nice day!

Charlene Cleveland  
Regional Officer, Licensing Services  
Dept of Fisheries & Oceans  
Dartmouth, Nova Scotia  
Tel: (902) 426-9966  
Fax: (902) 426-5010  
[Licence.maritimes.permis@dfo-mpo.gc.ca](mailto:Licence.maritimes.permis@dfo-mpo.gc.ca)

---

**From:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO)  
**Sent:** 2017-November-30 1:14 PM  
**To:** Licence Maritimes / Permis Maritimes (DFO/MPO); Duggan, Charmaine; Kean, Jackie; Bowdring, Tony  
**Cc:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO); Lavigne, Élise; Farr, Connie; Chmiel, Jim;  
[HlxEcareg1@innav.gc.ca](mailto:HlxEcareg1@innav.gc.ca)  
**Subject:** IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Good afternoon,

Please see attached US Marine Scientific Research (MSR) request for the **OCEARCH, Sep 1 – Oct 31, 2018**. It appears as though the proponent intends to conduct work in both Newfoundland and Maritimes Regions (though primarily in Maritimes).

The vessel intends to call on Halifax, NS, between **Sep 9 – Oct 31, 2018**, for provisioning.

We kindly request all responses by **August 1, 2018**.

Best wishes,

Andrew

## Cleveland, Charlene

---

**From:** Cleveland, Charlene  
**Sent:** 2018-June-01 4:00 PM  
**To:** Pye, Brad  
**Subject:** FW: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)  
**Attachments:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018); Ocearch - September 1 to October 31, 2018 (Final).doc

**Follow Up Flag:** Follow up  
**Flag Status:** Flagged

Good afternoon Brad – as per the attached e-mail, dated May 28<sup>th</sup>, this foreign vessel licence has been revisited and changes have been made to the conditions to be attached, should the licence be approved by the RDG.

Verna Doherty has asked if the highlighted text in Yellow can be removed from the C&P contribution, as she feels that we shouldn't identify specific vessels.

- Swordfish longline gear may be in other areas.
- Pelagic Longline Gear have AIS beacons attached.
- Beacons from a licence holder have the same vessel prefix on each beacon [REDACTED]
- There will be a string of beacons on a line. It is not possible to travel between the beacons with the research vessel.
- It is possible to travel a suitable distance alongside a pelagic longline set.

Please advise at your earliest convenience.

---

Thanks,

Charlene Cleveland  
Licensing Officer  
Martimes Region – Dartmouth  
Phone: 902-426-1929  
[Charlene.cleveland@dfo-mpo.gc.ca](mailto:Charlene.cleveland@dfo-mpo.gc.ca)

---

**From:** Cleveland, Charlene  
**Sent:** 2018-May-28 2:21 PM  
**To:** Docherty, Verna; MacDonald, Carl; Vézina, Alain; Pye, Brad; Herbert, Glen  
**Cc:** Berthier, Jacinta; Daley, Annette  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

As per Verna's e-mail, please find attached the draft version of the Foreign Fishing Vessel Licence Approval form for the OCEARCH. I have added the comments and/or conditions provided to date. The attached email and Schedule 38 from Erin Dunne, NL Region, will be attached to the licence prior to issuance. Please change or add to the document, as necessary.

Please feel free to contact me should you have questions.

Charlene Cleveland  
Licensing Officer

Martimes Region – Dartmouth  
Phone: 902-426-1929  
[Charlene.cleveland@dfo-mpo.gc.ca](mailto:Charlene.cleveland@dfo-mpo.gc.ca)

---

**From:** Docherty, Verna  
**Sent:** 2018–May-28 2:10 PM  
**To:** Cleveland, Charlene; MacDonald, Carl; Vézina, Alain; Pye, Brad; Herbert, Glen  
**Cc:** Berthier, Jacinta; Licence Maritimes / Permis Maritimes (DFO/MPO); Daley, Annette  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Good afternoon all.

By copy of this email, I'll ask Charlene to recirculate the Foreign Fishing Vessel Licence Approval form to all to review their original input. If there are concerns that can be addressed by the addition of conditions of licence, please provide the exact wording that you would like to have included, including specifics on reporting timelines, addresses to submit reports, etc.

I note that RM (Carl) has a question on the shark species that are the subject of the research. If there are additional questions, please let Licensing know ASAP so we can coordinate our communications with the proponent.

As always, if you have any questions for me, I'm happy to discuss.

Kind regards,  
Verna

**From:** Vézina, Alain  
**Sent:** Monday, May 28, 2018 7:08 AM  
**To:** Daley, Annette <Annette.Daley@dfo-mpo.gc.ca>  
**Cc:** Berthier, Jacinta <Jacinta.Berthier@dfo-mpo.gc.ca>; Docherty, Verna <Verna.Docherty@dfo-mpo.gc.ca>; MacDonald, Carl <Carl.MacDonald@dfo-mpo.gc.ca>; Licence Maritimes / Permis Maritimes (DFO/MPO) <RegionalLicensing.XMAR@dfo-mpo.gc.ca>; Herbert, Glen <Glen.Herbert@dfo-mpo.gc.ca>; Pye, Brad <Brad.Pye@dfo-mpo.gc.ca>; King, Rhea L <Rhea.King@dfo-mpo.gc.ca>; Lambert, Robert <Robert.Lambert@dfo-mpo.gc.ca>  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Thanks Annette,

From Science's perspective, conditions that flow from my concerns are those that are generally applied by coastal states under the UNCLOS MSR guidelines, i.e.

A preliminary report is submitted to <appropriate office in GAC> no later than x months after the end date of the authorized mission.

A copy of all the data collected during the marine scientific research activities is provided to us.

A copy of the final report produced that incorporates information obtained from the marine scientific research is provided to us no later than x years after the end of the mission.

These are the conditions that are imposed on us when we ask for permission to operate in US waters. I have no idea what GAC requires already in their consent letter and if these conditions are included. If they are, fine. If not, this is the minimum we need to do to ensure that we do our due diligence.

**IMPORTANT:** [REDACTED] RM also has some serious questions about use of bait, coordination with Canadian research, etc .... that should be turned into conditions. Also how will we ensure that the observer condition on the SARA permit is met? [REDACTED]

Alain

**From:** Daley, Annette  
**Sent:** May 25, 2018 4:33 PM  
**To:** Vézina, Alain <[Alain.Vezina@dfo-mpo.gc.ca](mailto:Alain.Vezina@dfo-mpo.gc.ca)>  
**Cc:** Berthier, Jacinta <[Jacinta.Berthier@dfo-mpo.gc.ca](mailto:Jacinta.Berthier@dfo-mpo.gc.ca)>; Docherty, Verna <[Verna.Docherty@dfo-mpo.gc.ca](mailto:Verna.Docherty@dfo-mpo.gc.ca)>; MacDonald, Carl <[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca)>; Licence Maritimes / Permis Maritimes (DFO/MPO) <[RegionalLicensing.XMAR@dfo-mpo.gc.ca](mailto:RegionalLicensing.XMAR@dfo-mpo.gc.ca)>; Herbert, Glen <[Glen.Herbert@dfo-mpo.gc.ca](mailto:Glen.Herbert@dfo-mpo.gc.ca)>; Pye, Brad <[Brad.Pye@dfo-mpo.gc.ca](mailto:Brad.Pye@dfo-mpo.gc.ca)>; King, Rhea L <[Rhea.King@dfo-mpo.gc.ca](mailto:Rhea.King@dfo-mpo.gc.ca)>; Lambert, Robert <[Robert.Lambert@dfo-mpo.gc.ca](mailto:Robert.Lambert@dfo-mpo.gc.ca)>  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Alain and Rhea - The recommendation has not gone back to Global Affairs so Ocearch has not been informed. Therefore we will go back around with the review process and perhaps Alain, there is a section in the form to add conditions that would be required to be met under the RDGs signature if we wanted to go that route rather than denying the application. Apparently NL is authorizing some work in Placentia Bay.

*Annette*

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**Sent:** Wednesday, May 23, 2018 1:37 PM  
**To:** MacDonald, Carl <[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca)>; Licence Maritimes / Permis Maritimes (DFO/MPO) <[RegionalLicensing.XMAR@dfo-mpo.gc.ca](mailto:RegionalLicensing.XMAR@dfo-mpo.gc.ca)>; Herbert, Glen <[Glen.Herbert@dfo-mpo.gc.ca](mailto:Glen.Herbert@dfo-mpo.gc.ca)>; Pye, Brad <[Brad.Pye@dfo-mpo.gc.ca](mailto:Brad.Pye@dfo-mpo.gc.ca)>  
**Cc:** Daley, Annette <[Annette.Daley@dfo-mpo.gc.ca](mailto:Annette.Daley@dfo-mpo.gc.ca)>; Berthier, Jacinta <[Jacinta.Berthier@dfo-mpo.gc.ca](mailto:Jacinta.Berthier@dfo-mpo.gc.ca)>  
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This research activity will **not** contribute to the Canadian scientific community. Canadian collaborators do not see the benefit of working with Ocearch, even though they have contacted all major Atlantic Universities (Dal, Memorial, Acadia etc), DFO (Heather Bowlby, Mark Simpson), non-profits (Grand Manan Seabird and Whale Research), OTN over the last 2 years. As pointed out by Carl, Heather holds a SARA permit and has an equivalent tagging program for white shark (aka duplication of research effort on a single population of an endangered species). The area that Heather works out of is the outside of St. Margret's Bay or immediately adjacent to Mahone Bay. The main tag type they use is optimized for instantaneous geolocation (excellent opportunities for twitter) but gives no information on habitat use – as needed for SARA research questions.

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Although I did not change the response in the form, I have no record of a previous approval for this organization.

Outside of my purview, but I understand that the SARA permit requires a DFO observer during at least part of their trip. How will that condition be fulfilled?



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**Cc:** Daley, Annette <[Annette.Daley@dfo-mpo.gc.ca](mailto:Annette.Daley@dfo-mpo.gc.ca)>; Berthier, Jacinta <[Jacinta.Berthier@dfo-mpo.gc.ca](mailto:Jacinta.Berthier@dfo-mpo.gc.ca)>

**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

**Questions/Comments Regarding Proposed Research:**

- Would it be possible for the researcher to describe the bait type they propose to use? ie Will the researcher be using Marine Mammal parts for Bait? If so, where will this Marine Mammal bait be acquired?
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**Sent:** 2018-May-22 4:06 PM

**To:** Licence Maritimes / Permis Maritimes (DFO/MPO); Vézina, Alain; Herbert, Glen; Pye, Brad

**Cc:** Daley, Annette

**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

**Large Pelagic Comments:**

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[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca) | Tél: 902-293-8257 | Télécopieur: 902-426-7967

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**Sent:** 2018-May-18 10:24 AM  
**To:** Vézina, Alain; Herbert, Glen; Pye, Brad; MacDonald, Carl  
**Cc:** Daley, Annette  
**Subject:** FW: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)  
**Importance:** High

Good morning – the response time has been changed to **June 1<sup>st</sup>** instead of the original **August 1<sup>st</sup>** request.

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Thanks and have a nice day!

Charlene Cleveland  
Regional Officer, Licensing Services  
Dept of Fisheries & Oceans  
Dartmouth, Nova Scotia  
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Fax: (902) 426-5010  
[Licence.maritimes.permis@dfo-mpo.gc.ca](mailto:Licence.maritimes.permis@dfo-mpo.gc.ca)

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**Sent:** 2017-November-30 1:14 PM  
**To:** Licence Maritimes / Permis Maritimes (DFO/MPO); Duggan, Charmaine; Kean, Jackie; Bowdring, Tony  
**Cc:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO); Lavigne, Élise; Farr, Connie; Chmiel, Jim;  
[HlxEcareg1@innav.gc.ca](mailto:HlxEcareg1@innav.gc.ca)  
**Subject:** IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Good afternoon,

Please see attached US Marine Scientific Research (MSR) request for the **OCEARCH, Sep 1 – Oct 31, 2018**. It appears as though the proponent intends to conduct work in both Newfoundland and Maritimes Regions (though primarily in Maritimes).

The vessel intends to call on Halifax, NS, between **Sep 9 – Oct 31, 2018**, for provisioning.

We kindly request all responses by **August 1, 2018**.

Best wishes,

Andrew

## Cleveland, Charlene

---

**From:** Dunne, Erin  
**Sent:** 2018-May-24 11:55 AM  
**To:** Cleveland, Charlene; Goobie, Alyssa K  
**Cc:** Hawkins, Laurie; Parsons, Dave; Miri, Carolyn  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)  
**Attachments:** Schedule 38 FINAL.docx

Hi Charlene, please add the condition noted below and the attached schedule to the licence.

### MARINE MAMMALS

While operating under this licence, you must abide by the conditions as described in Schedule 38 (MARINE MAMMAL INTERACTIONS AND MANAGEMENT MEASURES) which must be attached to this licence.

Thank you,  
Erin

---

**From:** Parsons, Dave  
**Sent:** May-18-18 1:41 PM  
**To:** Cleveland, Charlene; Hawkins, Laurie; Dunne, Erin; Goobie, Alyssa K  
**Subject:** FW: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)  
**Importance:** High

Thx Charlene, By way of this response, I'll ask the Resource mgrs to review and comment.

Alyssa, can you forward to our contact in science for review/comments.

---

**From:** Cleveland, Charlene  
**Sent:** 2018-May-18 11:00 AM  
**To:** Parsons, Dave  
**Subject:** FW: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)  
**Importance:** High

Good morning Dave – I am not sure who should review this Foreign Vessel application for your Region, but I thought I would start with you.

The Foreign Vessel application is for a cruise that appears to include **Placentia Bay, Nfld.** In the past, if waters from another Region were listed, we have forwarded the application to that Region for their comments and/or approval. If approved we will include the area on the Foreign Vessel Licence that we issued to the vessel.

Please advise or feel free to contact me to discuss.

Thanks and have a nice day!

Charlene Cleveland  
Licensing Officer  
Maritime Region – Dartmouth  
Phone: 902-426-1929  
[Charlene.cleveland@dfo-mpo.gc.ca](mailto:Charlene.cleveland@dfo-mpo.gc.ca)

---

**From:** Licence Maritimes / Permis Maritimes (DFO/MPO)  
**Sent:** 2018-May-18 10:24 AM  
**To:** Vézina, Alain; Herbert, Glen; Pye, Brad; MacDonald, Carl  
**Cc:** Daley, Annette  
**Subject:** FW: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)  
**Importance:** High

Good morning – the response time has been changed to **June 1<sup>st</sup>** instead of the original **August 1<sup>st</sup>** request.

Please review and provide comments/approval for the attached Foreign Vessel Cruise for Scientific Research (Shark species including White Shark).

I have asked NCR to have the applicant provide us with a Map of the Area to be studied, as the areas are only recorded under section 3 of the application. Placentia Bay, Nfld is listed, but as we do not licence vessels for other waters, I will notify Nfld licensing that this application will be reviewed and no doubt, approved for our waters. If Nfld requests that Placentia Bay be included, we will do that.

Thanks and have a nice day!

Charlene Cleveland  
Regional Officer, Licensing Services  
Dept of Fisheries & Oceans  
Dartmouth, Nova Scotia  
Tel: (902) 426-9966  
Fax: (902) 426-5010  
[Licence.maritimes.permis@dfo-mpo.gc.ca](mailto:Licence.maritimes.permis@dfo-mpo.gc.ca)

---

**From:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO)  
**Sent:** 2017–November-30 1:14 PM  
**To:** Licence Maritimes / Permis Maritimes (DFO/MPO); Duggan, Charmaine; Kean, Jackie; Bowdring, Tony  
**Cc:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO); Lavigne, Élise; Farr, Connie; Chmiel, Jim;  
[HlxEcareg1@innav.gc.ca](mailto:HlxEcareg1@innav.gc.ca)  
**Subject:** IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Good afternoon,

Please see attached US Marine Scientific Research (MSR) request for the **OCEARCH, Sep 1 – Oct 31, 2018**. It appears as though the proponent intends to conduct work in both Newfoundland and Maritimes Regions (though primarily in Maritimes).

The vessel intends to call on Halifax, NS, between **Sep 9 – Oct 31, 2018**, for provisioning.

We kindly request all responses by **August 1, 2018**.

Best wishes,

Andrew

## Schedule 38 – MARINE MAMMAL INTERACTIONS AND MANAGEMENT

Your licence is subject to the following conditions. These conditions are part of your licence and must remain attached to your fishing licence.

### DEFINITIONS

1. For the purposes of these conditions lethal and non-lethal marine mammal interactions is defined as interactions that include bycatch or collision of all marine mammals and all sightings of marine mammals entangled in fishing gear.
2. For the purposes of these conditions primary buoy is defined as a buoy or other floating device attached to fishing gear.
3. For the purposes of these conditions a secondary buoy is defined as: a buoy or other floating device attached to a primary buoy.

### MARINE MAMMAL INTERACTION REPORTING

4. You must provide information regarding all lethal and non-lethal marine mammal interactions during fishing trips.
5. For the purpose of section 4, lethal and non-lethal interactions are defined in subsection 1.
6. You must complete the DFO Marine Mammal Interaction Form and it must be submitted as per the instructions provided on the form. This form is located online at <http://www.dfo-mpo.gc.ca/fm-gp/mammals-mammiferes/report-rapport-eng.html>. This form can be completed and submitted online or if you prefer, you can fax or email the printed form.

#### Reporting Lost Gear

7. You must report any lost fishing gear, including the last known latitude and longitude positions, to the nearest DFO Conservation and Protection Detachment office within 48 hours after the fishing trip ends.

#### Reporting Sightings of North Atlantic Whale

8. You must report all sightings of North Atlantic Right Whales by calling 1-888-895-3003 as soon as possible or at least within 24 hours after sighting.

### GEAR RESTRICTIONS

This section applies to the following fisheries: American Plaice, Greenland Halibut, Monkfish, Northern Cod, Snow crab, Whelk and Winter Flounder .

### Rope on Water Surface

9. For the purpose of these licence conditions, a primary buoy is defined in subsection 2. For the purpose of these licence conditions, a secondary buoy is defined in subsection 3.

10. A maximum of 6.4 meters of rope shall be used when attaching a secondary buoy to a primary buoy.

11. No rope attaching a crab trap to a primary buoy shall remain floating on the surface of the water after the crab trap has been set.

### Sequential Numbering

12. While fishing under this licence, you must identify each buoy with a sequential number.

(For example if you use 20 buoys among all of your fishing gear then each buoy must be sequentially numbered from 1 to 20. Buoy 1 must be marked as #1, buoy 2 must be marked as #2 and so forth, the last buoy would be marked as #20.)

13. The sequential number referred above must be painted on or otherwise securely affixed to the primary buoy.

14. The sequential number must be legible and be solid block Arabic numerals:

- a) without ornamentation;
- b) written in a smaller or bigger scale than the vessel registration as to be capable of differentiating the number from the vessel registration ; and
- c) in a color that contrast with their background.

### INFORMATION

15. If you have a whale (live or dead) caught in your fishing gear you can call 1-888-895-3003 for assistance.

16. If you see a whale or turtle, you can email [telljack@dfo-mpo.gc.ca](mailto:telljack@dfo-mpo.gc.ca) or tweet Jack@DFO\_NL #whale or #leatherback

**MacDonald, Jennifer**

---

**From:** Vézina, Alain  
**Sent:** June-01-18 10:03 AM  
**To:** Humphrey, Donald; Daley, Annette; King, Rhea L  
**Cc:** Lambert, Robert  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Thanks Donald,

This is good to know. The science input you received for the SARA permit does match the advice I got for the RM permitting. [REDACTED]

[REDACTED] The SPOT tag is just to track large scale migrations and they are not using the commercial PSAT tag, so we don't know what environmental information their tags will collect, and whether we will be able to use that information to better understand habitat use (which is the real question we need to answer for SARA purposes). [REDACTED]

[REDACTED]

Alain

**From:** Humphrey, Donald  
**Sent:** May 31, 2018 2:43 PM  
**To:** Vézina, Alain <Alain.Vezina@dfo-mpo.gc.ca>; Daley, Annette <Annette.Daley@dfo-mpo.gc.ca>; King, Rhea L <Rhea.King@dfo-mpo.gc.ca>  
**Cc:** Lambert, Robert <Robert.Lambert@dfo-mpo.gc.ca>  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Hi Alain, attached is a summary of discussions we had with Science staff. The advice was considered as part of the SARA permit review and assessment process.

Not sure if you are familiar with the assessment form for SARA, as it does not require approval by other sectors. I have attached it just so you and others are aware of the questions that are considered as part of the assessment.

If there are any other questions, just let me know.

Thanks,

Donald

---

**From:** Vézina, Alain  
**Sent:** May-29-18 7:16 AM  
**To:** Humphrey, Donald; Daley, Annette; King, Rhea L  
**Cc:** Lambert, Robert  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Donald,



there are no plans for DFO science to participate in the OCEARCH mission or collaborate with this organization.

What advice did you receive from Science on the SARA permitting for this research?

Alain

**From:** Humphrey, Donald  
**Sent:** May 28, 2018 9:23 PM  
**To:** Daley, Annette <[Annette.Daley@dfo-mpo.gc.ca](mailto:Annette.Daley@dfo-mpo.gc.ca)>; Vézina, Alain <[Alain.Vezina@dfo-mpo.gc.ca](mailto:Alain.Vezina@dfo-mpo.gc.ca)>; King, Rhea L <[Rhea.King@dfo-mpo.gc.ca](mailto:Rhea.King@dfo-mpo.gc.ca)>  
**Cc:** Lambert, Robert <[Robert.Lambert@dfo-mpo.gc.ca](mailto:Robert.Lambert@dfo-mpo.gc.ca)>  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Hi Annette, just a few comments/questions below for consideration.

I should note that we attempted to coordinate our SARA permitting process with that of RM but have regulatory timelines that had to be met and could not be aligned with the timeframe for this approval process.

Thanks, Donald

---

**From:** Daley, Annette  
**Sent:** May-28-18 4:22 PM  
**To:** Vézina, Alain; King, Rhea L; Humphrey, Donald  
**Cc:** Lambert, Robert  
**Subject:** FYI: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

**From:** MacDonald, Carl  
**Sent:** Monday, May 28, 2018 9:58 AM  
**To:** Daley, Annette <[Annette.Daley@dfo-mpo.gc.ca](mailto:Annette.Daley@dfo-mpo.gc.ca)>; Berthier, Jacinta <[Jacinta.Berthier@dfo-mpo.gc.ca](mailto:Jacinta.Berthier@dfo-mpo.gc.ca)>  
**Cc:** Docherty, Verna <[Verna.Docherty@dfo-mpo.gc.ca](mailto:Verna.Docherty@dfo-mpo.gc.ca)>; Licence Maritimes / Permis Maritimes (DFO/MPO) <[RegionalLicensing.XMAR@dfo-mpo.gc.ca](mailto:RegionalLicensing.XMAR@dfo-mpo.gc.ca)>  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Hi Annette and Jacinta,

For your consideration

DFO Requests the proponent to specify the shark species intended for this research. Currently the proponent only indicates Shark Species - including White Shark. Proponent is to list all species (sharks) they are conducting research on. When we know all the species – a condition can be added to specify these are the only shark species authorized to conduct research on.

#### Conditions

- Marine mammal parts may not be offered to sharks for feeding or consumption, will not be ingested by sharks, and pieces of marine mammal tissue will not be thrown overboard to attract sharks.
- Efforts to lure, capture, or tag sharks will not occur in close proximity (within two nautical miles) of endangered whale species, including North Atlantic Right Whales (*Eubalaena glacialis*). What is the rationale here?
- This licence does not authorize research in the area of Mahone Bay, Nova Scotia.

- The licence holder may be required to have an observer (at-sea) on board the vessel during any trip. When required to take an at-sea observer, the licence holder shall not depart from port until the at-sea observer is on board. We included a condition to have observers on board to allow for staff to participate on one or more voyages to assess compliance with conditions of the SARA permit. Ideally, we would like Science to participate as well, but recognize that this may not be possible due to other commitments and constraints.

Regards,

Carl MacDonald  
Resource Management  
Fisheries & Oceans Canada | Government of Canada  
[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca) | Tel: 902-293-8257 | Fax: 902-426-7967

Regional agent principal de gestion des pêches, Gestion des ressources  
Pêches et Océans Canada | Gouvernement du Canada  
[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca) | Tél: 902-293-8257 | Télécopieur: 902-426-7967

---

**From:** Daley, Annette  
**Sent:** 2018-May-28 8:54 AM  
**To:** Licence Maritimes / Permis Maritimes (DFO/MPO)  
**Cc:** Berthier, Jacinta; Docherty, Verna; MacDonald, Carl  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Charlene, when RM completes the boxes in the form and add any conditions as Science has, the completed form should be sent around for sign off by RDs, before going to the RDG. Thx

*Annette*

**From:** Vézina, Alain  
**Sent:** Monday, May 28, 2018 7:08 AM  
**To:** Daley, Annette <[Annette.Daley@dfo-mpo.gc.ca](mailto:Annette.Daley@dfo-mpo.gc.ca)>  
**Cc:** Berthier, Jacinta <[Jacinta.Berthier@dfo-mpo.gc.ca](mailto:Jacinta.Berthier@dfo-mpo.gc.ca)>; Docherty, Verna <[Verna.Docherty@dfo-mpo.gc.ca](mailto:Verna.Docherty@dfo-mpo.gc.ca)>; MacDonald, Carl <[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca)>; Licence Maritimes / Permis Maritimes (DFO/MPO) <[RegionalLicensing.XMAR@dfo-mpo.gc.ca](mailto:RegionalLicensing.XMAR@dfo-mpo.gc.ca)>; Herbert, Glen <[Glen.Herbert@dfo-mpo.gc.ca](mailto:Glen.Herbert@dfo-mpo.gc.ca)>; Pye, Brad <[Brad.Pye@dfo-mpo.gc.ca](mailto:Brad.Pye@dfo-mpo.gc.ca)>

mpo.gc.ca>; King, Rhea L <[Rhea.King@dfo-mpo.gc.ca](mailto:Rhea.King@dfo-mpo.gc.ca)>; Lambert, Robert <[Robert.Lambert@dfo-mpo.gc.ca](mailto:Robert.Lambert@dfo-mpo.gc.ca)>  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Thanks Annette,

From Science's perspective, conditions that flow from my concerns are those that are generally applied by coastal states under the UNCLOS MSR guidelines, i.e.

A preliminary report is submitted to <appropriate office in GAC> no later than x months after the end date of the authorized mission.

A copy of all the data collected during the marine scientific research activities is provided to us.

A copy of the final report produced that incorporates information obtained from the marine scientific research is provided to us no later than x years after the end of the mission.

These are the conditions that are imposed on us when we ask for permission to operate in US waters. I have no idea what GAC requires already in their consent letter and if these conditions are included. If they are, fine. If not, this is the minimum we need to do to ensure that we do our due diligence.

**IMPORTANT:** [REDACTED] RM also has some serious questions about use of bait, coordination with Canadian research, etc .... that should be turned into conditions. Also how will we ensure that the observer condition on the SARA permit is met? [REDACTED]

Alain

**From:** Daley, Annette

**Sent:** May 25, 2018 4:33 PM

**To:** Vézina, Alain <[Alain.Vezina@dfo-mpo.gc.ca](mailto:Alain.Vezina@dfo-mpo.gc.ca)>

**Cc:** Berthier, Jacinta <[Jacinta.Berthier@dfo-mpo.gc.ca](mailto:Jacinta.Berthier@dfo-mpo.gc.ca)>; Docherty, Verna <[Verna.Docherty@dfo-mpo.gc.ca](mailto:Verna.Docherty@dfo-mpo.gc.ca)>;

MacDonald, Carl <[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca)>; Licence Maritimes / Permis Maritimes (DFO/MPO)

<[RegionalLicensing.XMAR@dfo-mpo.gc.ca](mailto:RegionalLicensing.XMAR@dfo-mpo.gc.ca)>; Herbert, Glen <[Glen.Herbert@dfo-mpo.gc.ca](mailto:Glen.Herbert@dfo-mpo.gc.ca)>; Pye, Brad <[Brad.Pye@dfo-mpo.gc.ca](mailto:Brad.Pye@dfo-mpo.gc.ca)>;

King, Rhea L <[Rhea.King@dfo-mpo.gc.ca](mailto:Rhea.King@dfo-mpo.gc.ca)>; Lambert, Robert <[Robert.Lambert@dfo-mpo.gc.ca](mailto:Robert.Lambert@dfo-mpo.gc.ca)>

**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Alain and Rhea - The recommendation has not gone back to Global Affairs so Ocearch has not been informed. Therefore we will go back around with the review process and perhaps Alain, there is a section in the form to add conditions that would be required to be met under the RDGs signature if we wanted to go that route rather than denying the application. Apparently NL is authorizing some work in Placentia Bay.

*Annette*

**From:** Vézina, Alain

**Sent:** Wednesday, May 23, 2018 1:37 PM

**To:** MacDonald, Carl <[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca)>; Licence Maritimes / Permis Maritimes (DFO/MPO)

<[RegionalLicensing.XMAR@dfo-mpo.gc.ca](mailto:RegionalLicensing.XMAR@dfo-mpo.gc.ca)>; Herbert, Glen <[Glen.Herbert@dfo-mpo.gc.ca](mailto:Glen.Herbert@dfo-mpo.gc.ca)>; Pye, Brad <[Brad.Pye@dfo-mpo.gc.ca](mailto:Brad.Pye@dfo-mpo.gc.ca)>

**Cc:** Daley, Annette <[Annette.Daley@dfo-mpo.gc.ca](mailto:Annette.Daley@dfo-mpo.gc.ca)>; Berthier, Jacinta <[Jacinta.Berthier@dfo-mpo.gc.ca](mailto:Jacinta.Berthier@dfo-mpo.gc.ca)>

**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

With respect to the questions on the science section of the approval form:

This research activity will **not** contribute to the Canadian scientific community. Canadian collaborators do not see the benefit of working with Oearch, even though they have contacted all major Atlantic Universities (Dal, Memorial, Acadia etc), DFO (Heather Bowlby, Mark Simpson), non-profits (Grand Manan Seabird and Whale Research), OTN over the last 2 years. As pointed out by Carl, Heather holds a SARA permit and has an equivalent tagging program for white shark (aka duplication of research effort on a single population of an endangered species). The area that Heather works out of is the outside of St. Margret's Bay or immediately adjacent to Mahone Bay. The main tag type they use is optimized for instantaneous geolocation (excellent opportunities for twitter) but gives no information on habitat use – as needed for SARA research questions.

Canadian scientists will **not** have access to the research data.

Based on this information, I cannot recommend approval at this time. The amended approval form is attached.

Although I did not change the response in the form, I have no record of a previous approval for this organization.

Outside of my purview, but I understand that the SARA permit requires a DFO observer during at least part of their trip. How will that condition be fulfilled?

Alain

**From:** MacDonald, Carl

**Sent:** May 23, 2018 10:32 AM

**To:** Licence Maritimes / Permis Maritimes (DFO/MPO) <RegionalLicensing.XMAR@dfo-mpo.gc.ca>; Vézina, Alain

<Alain.Vezina@dfo-mpo.gc.ca>; Herbert, Glen <Glen.Herbert@dfo-mpo.gc.ca>; Pye, Brad <Brad.Pye@dfo-mpo.gc.ca>

**Cc:** Daley, Annette <Annette.Daley@dfo-mpo.gc.ca>; Berthier, Jacinta <Jacinta.Berthier@dfo-mpo.gc.ca>

**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

#### Questions/Comments Regarding Proposed Research:

- Would it be possible for the researcher to describe the bait type they propose to use? ie Will the researcher be using Marine Mammal parts for Bait? If so, where will this Marine Mammal bait be acquired?
- Would it be possible for the researcher to be more specific regarding the shark species intended for this research? Currently the document only indicates Shark Species - including White Shark.
- It is important to note that Canadian shark researcher (Heather Bowlby) has been approved to conducted research on the same species (White Shark) in the same area (Mahone Bay).

Regards,

Carl MacDonald

Resource Management

Fisheries & Oceans Canada | Government of Canada

[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca) | Tel: 902-293-8257 | Fax: 902-426-7967

Regional agent principal de gestion des peches, Gestion des ressources

Pêches et Océans Canada | Gouvernement du Canada

[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca) | Tél: 902-293-8257 | Télécopieur: 902-426-7967

---

**From:** MacDonald, Carl  
**Sent:** 2018-May-22 4:06 PM  
**To:** Licence Maritimes / Permis Maritimes (DFO/MPO); Vézina, Alain; Herbert, Glen; Pye, Brad  
**Cc:** Daley, Annette  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Large Pelagic Comments:

1. *Large pelagic sector.* Pelagic longline fishing takes place along the edge of the Scotian Shelf where the large pelagic fleet conducts operations. Caution must be taken to ensure that the scientific research vessel does not cross previously deployed pelagic longlines which run near the surface for distances of 30 - 40 nm. Damaged gear and identifying marks are to be reported to DFO ([Brad.Pye@dfo-mpo.gc.ca](mailto:Brad.Pye@dfo-mpo.gc.ca)) immediately. Vessel is to continuously broadcast an AIS signal.
  - Swordfish longline gear may be in other areas.
  - Pelagic Longline Gear have AIS beacons attached.
  - Beacons from a licence holder have the same vessel prefix on each beacon [REDACTED]
  - There will be a string of beacons on a line. It is not possible to travel between the beacons with the research vessel.
  - It is possible to travel a suitable distance alongside a pelagic longline set.

Regards,

Carl MacDonald  
 Resource Management  
 Fisheries & Oceans Canada | Government of Canada  
[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca) | Tel: 902-293-8257 | Fax: 902-426-7967

Regional agent principal de gestion des peches, Gestion des ressources  
 Pêches et Océans Canada | Gouvernement du Canada  
[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca) | Tél: 902-293-8257 | Télécopieur: 902-426-7967

---

**From:** Licence Maritimes / Permis Maritimes (DFO/MPO)  
**Sent:** 2018-May-18 10:24 AM  
**To:** Vézina, Alain; Herbert, Glen; Pye, Brad; MacDonald, Carl  
**Cc:** Daley, Annette  
**Subject:** FW: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)  
**Importance:** High

Good morning – the response time has been changed to **June 1<sup>st</sup>** instead of the original **August 1<sup>st</sup>** request.

Please review and provide comments/approval for the attached Foreign Vessel Cruise for Scientific Research (Shark species including White Shark).

I have asked NCR to have the applicant provide us with a Map of the Area to be studied, as the areas are only recorded under section 3 of the application. Placentia Bay, Nfld is listed, but as we do not licence vessels for other waters, I will notify Nfld licensing that this application will be reviewed and no doubt, approved for our waters. If Nfld requests that Placentia Bay be included, we will do that.

Thanks and have a nice day!

Charlene Cleveland  
Regional Officer, Licensing Services  
Dept of Fisheries & Oceans  
Dartmouth, Nova Scotia  
Tel: (902) 426-9966  
Fax: (902) 426-5010  
[Licence.maritimes.permis@dfo-mpo.gc.ca](mailto:Licence.maritimes.permis@dfo-mpo.gc.ca)

---

**From:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO)  
**Sent:** 2017–November-30 1:14 PM  
**To:** Licence Maritimes / Permis Maritimes (DFO/MPO); Duggan, Charmaine; Kean, Jackie; Bowdring, Tony  
**Cc:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO); Lavigne, Élise; Farr, Connie; Chmiel, Jim;  
[HlxEcareg1@innav.gc.ca](mailto:HlxEcareg1@innav.gc.ca)  
**Subject:** IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Good afternoon,

Please see attached US Marine Scientific Research (MSR) request for the **OCEARCH, Sep 1 – Oct 31, 2018**. It appears as though the proponent intends to conduct work in both Newfoundland and Maritimes Regions (though primarily in Maritimes).

The vessel intends to call on Halifax, NS, between **Sep 9 – Oct 31, 2018**, for provisioning.

We kindly request all responses by **August 1, 2018**.

Best wishes,

Andrew

## **Cleveland, Charlene**

---

**From:** Pye, Brad  
**Sent:** 2018-June-04 8:44 AM  
**To:** Cleveland, Charlene  
**Subject:** Oearch  
**Attachments:** Oearch - September 1 to October 31 2018 (Final).doc

Sorry so late Charlene ☺ Let me know if u need anything else!!

Brad

**Bradford Pye**  
**Acting/Detachment Supervisor**  
**Fishery Officer | Agent de pêche**  
**Offshore Surveillance Unit | Unité de surveillance Offshore**  
**Argo Building Bedford Institute of Oceanography | Argo Building Bedford Institute of Oceanography**  
**Dartmouth, NS B2Y 4A2 | Dartmouth, (N-E), B2Y 4A2**  
**Telephone | Téléphone 902 499-0923**

# Foreign Fishing Vessel Licence Approval Form Scientific Research

Year: 2018 Country: USA  
Vessel Name: OCEARCH  
Research objectives: Expedition Nova Scotia – F2017-120  
Location of fishing activity: 5ZE, 4X, 4VsW  
Gear: Hook and Line, Mousetrap Drum Rig, Specially designed Lift System, Chase Boats and other oceanographic equipment

Dates of fishing activity: September 1 to October 31, 2018

## 1. To be completed by Science Branch

- (1) Does this research activity contribute to:
- |                                      |                              |  |   |
|--------------------------------------|------------------------------|--|---|
| • Canadian scientific community      | Yes <input type="checkbox"/> | No <input checked="" type="checkbox"/> | Unknown <input type="checkbox"/>            |
| • Canadian industry                  | Yes <input type="checkbox"/> | No <input type="checkbox"/>            | Unknown <input checked="" type="checkbox"/> |
| • International scientific community | Yes <input type="checkbox"/> | No <input type="checkbox"/>            | Unknown <input checked="" type="checkbox"/> |
- (2) Will Canadian scientists have access to the research data
- Yes ☐ No ☒
- (3) Will Canadian scientists be participating
- Yes ☐ No ☒
- (4) Primary species at which research is directed Shark Species including White Shark
- |                                    |   |                             |     |
|------------------------------------|---|-----------------------------|-----|
| • highly transboundary as adult    | Yes <input type="checkbox"/>            | No <input type="checkbox"/> | n/a |
| • somewhat transboundary as adult  | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/> |     |
| • sedentary as adult               | Yes <input type="checkbox"/>            | No <input type="checkbox"/> | n/a |
| • endangered or threatened species | Yes <input type="checkbox"/>            | No <input type="checkbox"/> | n/a |
- (5) Has this or a similar request been approved in previous years,  
i. e. long-term data series
- Yes ☒ No ☐

(6) Comments: See attached e-mail from Alain Vezina, dated May 23, 2018

Recommend Approval Yes ☐ No ☒

(electronic signature)

Alain Vezina  
Regional Director, Science

## 2. To be completed by Ecosystem Management

- (1) Does the area of research activity fall within the boundaries of any:
- |   |     |
|---|-----|
| • Marine Protected Area (MPA)                                 | N/A |
| • area closed to Canadian fishers because of habitat concerns | N/A |
| • integrated management area                                  | N/A |
| • area with habitat sensitivities                             | N/A |
- (2) If yes to a MPA, does the research support the MPA objectives?
- N/A



- (3) If yes to any other area, could the research activity be carried out with minimal impact because of the gear type or with restrictions

Yes (see note below)

**Comments:**

**Whales**

- 
- R/V to report sightings of North Atlantic right whales (same day if possible) to DFO Maritimes Region. Contact: 1-844-800-8568; [XMARWhalesightings@dfo-mpo.gc.ca](mailto:XMARWhalesightings@dfo-mpo.gc.ca). All whale records (post voyage), including location, date and photos, to be submitted to DFO Maritimes Region.
- 
- R/V to adhere to guidance contained in Canadian Coast Guard Annual Notice to Mariners: A2 - 5. GENERAL GUIDELINES FOR AQUATIC SPECIES AT RISK AND IMPORTANT MARINE MAMMAL AREAS: Grand Manan Basin Critical Habitat and Roseway Basin Critical Habitat/Area To Be Avoided. See: <https://www.notmar.gc.ca/publications/annual-annuel/section-a/a5-en.php>
- 
- R/V to report any collisions with whales, entangled whales or dead whales to the whale emergency hotline (1-866-567-6277), VHF Channel 16, or Fundy Traffic VHF Channel 14.

Recommend Approval Yes   X   No     

(electronic signature)

---

**Glen Herbert**  
for the Regional Director  
Ecosystem Management

**3. To be completed by Fisheries Management**

- (1) Will Canadian observers be on board Yes      No   X
- (2) Have appropriate Canadian industry representatives been notified of the research activity Yes   X   No

List contacts: \_\_\_\_\_

- (3) Is the Canadian industry in support of the research activity Yes      No      N/A
- (4) Will the research activity likely impact or interfere with ongoing Canadian fisheries Yes      No   X

- (4) Comments: (see below)

**Additional C&P Conditions:**

---

**Large Pelagic Comments:**

1. *Large pelagic sector.* Pelagic longline fishing takes place along the edge of the Scotian Shelf where the large pelagic fleet conducts operations. Caution must be taken to ensure that the scientific research vessel does not cross previously deployed pelagic longlines which run near the surface for distances of 30 - 40 nm. Damaged gear and identifying marks are to be reported to DFO ([Brad.Pye@dfo-mpo.gc.ca](mailto:Brad.Pye@dfo-mpo.gc.ca)) immediately. Vessel is to continuously broadcast an AIS signal.
- Swordfish longline gear may be in other areas.
  - Pelagic Longline Gear have AIS beacons attached.
  - Beacons from a licence holder have the same vessel prefix on each beacon.
  - There will be a string of beacons on a line. It is not possible to travel between the beacons with the research vessel.
  - It is possible to travel a suitable distance alongside a pelagic longline set.

---

 Recommend Approval

Yes \_\_\_\_ No \_\_\_\_

---

**Annette Daley**  
**A/Regional Director,**  
**Fisheries Management**
**Deadline for approval/non-approval: May 28, 2018**

Approved \_\_\_\_ Not Approved \_\_\_\_

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**Mary-Ellen Valkenier**  
**Regional Director General**  
**Maritimes Region**  
**Fisheries & Oceans Canada**

Date: \_\_\_\_\_

**Additional Conditions:**


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**MacLellan, Elizabeth**

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**From:** Daley, Annette  
**Sent:** Wednesday, June 6, 2018 4:22 PM  
**To:** MacDonald, Carl; Berthier, Jacinta  
**Cc:** Docherty, Verna; Licence Maritimes / Permis Maritimes (DFO/MPO)  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Okay by me.

*Annette*

**From:** MacDonald, Carl  
**Sent:** Wednesday, June 6, 2018 3:01 PM  
**To:** Berthier, Jacinta <Jacinta.Berthier@dfo-mpo.gc.ca>; Daley, Annette <Annette.Daley@dfo-mpo.gc.ca>  
**Cc:** Docherty, Verna <Verna.Docherty@dfo-mpo.gc.ca>; Licence Maritimes / Permis Maritimes (DFO/MPO) <RegionalLicensing.XMAR@dfo-mpo.gc.ca>  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Hi Jacinta and Annette,

Below are my suggested RM changes to Ocearch request.  
Please concur or alter as required in order to proceed with RDG approval.

Conditions to add to licence.

- The licence holder is authorized to conduct research on the following shark species: White shark, Blue Shark, Porbeagle Shark, Common Thresher Shark, and Shortfin Mako Shark.
- Marine mammal parts may not be offered to sharks for feeding or consumption, may not be ingested by sharks, and pieces of marine mammal tissue may not be thrown overboard to attract sharks.
- Efforts to lure, capture, or tag sharks is not authorized to occur in close proximity (within two nautical miles) of endangered whale species, including North Atlantic Right Whales (*Eubalaena glacialis*).

Regards,

Carl MacDonald  
Resource Management  
Fisheries & Oceans Canada | Government of Canada  
[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca) | Tel: 902-293-8257 | Fax: 902-426-7967

Regional agent principal de gestion des peches, Gestion des ressources  
Pêches et Océans Canada | Gouvernement du Canada  
[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca) | Tél: 902-293-8257 | Télécopieur: 902-426-7967

**From:** Licence Maritimes / Permis Maritimes (DFO/MPO)  
**Sent:** 2018-June-04 4:20 PM  
**To:** Docherty, Verna; MacDonald, Carl  
**Subject:** FW: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Good afternoon – received this response to our request for additional information (Map for Cruise Track, Bait to be used and list of Shark Species)

I have the Foreign Vessel Application ready to go to the RD for signature (approval) and then to the RDG.

Please advise if you require any changes to this document.

Charlene Cleveland  
 Licensing Officer  
 Martimes Region – Dartmouth  
 Phone: 902-426-1929  
[Charlene.cleveland@dfo-mpo.gc.ca](mailto:Charlene.cleveland@dfo-mpo.gc.ca)

**From:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO)  
**Sent:** 2018-June-04 10:18 AM  
**To:** Licence Maritimes / Permis Maritimes (DFO/MPO)  
**Cc:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO)  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Good morning,

I've received the following in response to the below mentioned requests:

I have answered your questions below in **bold print** and have attached six relevant documents that should assist with providing more information for our request. These attached docs are:

1. Our full permit application to Canada DFO for a Species At Risk Act (SARA) permit.
2. Additional information that was provided to DFO for the SARA permit.
3. A table comparing two capture methods for large sharks and the scientific productivity of each.
4. Our granted SARA permit from DFO for the Maritimes Region.
5. Our granted SARA permit from DFO for Newfoundland.
6. Our authorization letter from NOAA for the use of marine mammal material in our related shark research in U.S. waters.

I refer to some of these documents in the answers to your questions below. Please refer to these docs for further information and I would be happy to clarify any points or provide additional information as needed. If a phone call will help, my direct office line is below and my cell number is [REDACTED]. Thanks so much for your assistance, it is much appreciated.

Best regards,

Dr. Bob Hueter

Additionally to the request that the proponents **provide a map of the proposed cruise track for inclusion in the application**, I have received a request for more information regarding the U.S. MSR for the OCEARCH (F2017-120):

**There is no "cruise track" per se for this expedition as we are not following a line transect but instead are sampling in certain key areas in Canadian waters. Please see attached doc #1 which contains a map of the SARA-permitted areas to sample on page 42 of the pdf. We will begin our work in the Mahone Bay region, where we know from our own satellite tracking data that large white sharks have traveled. We will move our operation as necessary to obtain the sample size of sharks we seek, as per the map shown in doc #1. If we are successful in Mahone Bay, we will not need to move to the other areas.**

- Would it be possible for the researcher to describe the bait type they propose to use? ie Will the researcher be using Marine Mammal parts for Bait? If so, where will this Marine Mammal bait be acquired?

**In U.S. waters we use marine mammal material obtained from dead, stranded baleen whales, provided to us by the Marine Mammal Response Network here under NOAA authorization shown in attached doc #6. The methods we use are described in attached docs #1, 2 and 6. We use marine mammal material as chum and bait to attract the white sharks in the area to our fishing boat, but do not allow the sharks to ingest the marine mammal bait. We cannot use marine mammal material obtained in U.S. waters in Canadian waters, so we are in the process of obtaining a similar authorization to obtain, possess and use marine mammal material in Canadian waters from DFO's Fisheries Management Branch. We sometimes use non-marine mammal material, such as small tuna species, to attract the sharks, but this is far less effective than blubber and other material from baleen whales, on which the white sharks naturally feed.**

- Would it be possible for the researcher to be more specific regarding the shark species intended for this research? Currently the document only indicates Shark Species - including White Shark.

**This expedition is targeting white sharks (*Carcharodon carcharias*). It is possible we will encounter other shark species in Canadian waters and we could sample and tag those species for Canadian collaborators if desired. Those species could include blue, porbeagle, thresher, or shortfin mako sharks. Any of these and other species could be sampled, tagged and released alive. However, if there are any permitting concerns for these other shark species, we can avoid any interactions with them and focus solely on the white shark.**

- It is important to note that Canadian shark researcher (Heather Bowlby) has been approved to conduct research on the same species (White Shark) in the same area (Mahone Bay).

**We have previously reached out to Dr. Bowlby and had productive email exchanges with her about collaboration, but that was well before we had obtained our SARA permit, and she did not commit to collaborate until we were authorized for our research in Canada. Now that we have our SARA permits, we will re-connect with her and offer to collaborate in any way she would like. Our goal is to engage with as many Canadian researchers as possible in this expedition. That is the OCEARCH model, to enable local capacity to conduct innovative studies of these large sharks through open collaboration of teams of researchers and students. We believe that Dr. Bowlby does not have access to a research ship similar to the M/V OCEARCH for her white shark research, and therefore we hope she accepts our offer of free shiptime to work collaboratively with us, as we are all working to solve similar questions in white shark biology and conservation.**

Please let me know if any further clarification is needed.

Best,

Andrew

---

**From:** Licence Maritimes / Permis Maritimes (DFO/MPO)  
**Sent:** May-30-18 12:36 PM  
**To:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO)  
**Subject:** FW: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)  
**Importance:** High

Good afternoon – as we are still working on revisiting this Foreign Vessel application for the above US vessel - Ocearch, and as per the e-mail below from Carl MacDonald, Senior Resource Manager, please have the applicant provide a **complete list of Shark species** that they will conducting research on. (highlighted in yellow)

The approval process will not move forward until this information is received and well as the previous requests for **additional information** is received (**map of research area and the bait description**)

Regards,

Charlene Cleveland  
 Regional Officer, Licensing Services  
 Dept of Fisheries & Oceans  
 Dartmouth, Nova Scotia  
 Tel: (902) 426-9966  
 Fax: (902) 426-5010  
[Licence.maritimes.permis@dfo-mpo.gc.ca](mailto:Licence.maritimes.permis@dfo-mpo.gc.ca)

---

**From:** MacDonald, Carl  
**Sent:** 2018-May-28 9:58 AM  
**To:** Daley, Annette; Berthier, Jacinta  
**Cc:** Docherty, Verna; Licence Maritimes / Permis Maritimes (DFO/MPO)  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Hi Annette and Jacinta,

For your consideration

**DFO Requests the proponent to specify the shark species intended for this research. Currently the proponent only indicates Shark Species - including White Shark. Proponent is to list all species (sharks) they are conducting research on. When we know all the species – a condition can be added to specify these are the only shark species authorized to conduct research on.**

Conditions

- Marine mammal parts may not be offered to sharks for feeding or consumption, will not be ingested by sharks, and pieces of marine mammal tissue will not be thrown overboard to attract sharks.
- Efforts to lure, capture, or tag sharks will not occur in close proximity (within two nautical miles) of endangered whale species, including North Atlantic Right Whales (*Eubalaena glacialis*).
- This licence does not authorize research in the area of Mahone Bay, Nova Scotia.

- The licence holder may be required to have an observer (at-sea) on board the vessel during any trip. When required to take an at-sea observer, the licence holder shall not depart from port until the at-sea observer is on board.

Regards,

Carl MacDonald  
Resource Management  
Fisheries & Oceans Canada | Government of Canada  
[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca) | Tel: 902-293-8257 | Fax: 902-426-7967

Regional agent principal de gestion des peches, Gestion des ressources  
Pêches et Océans Canada | Gouvernement du Canada  
[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca) | Tél: 902-293-8257 | Télécopieur: 902-426-7967

---

**From:** Daley, Annette  
**Sent:** 2018-May-28 8:54 AM  
**To:** Licence Maritimes / Permis Maritimes (DFO/MPO)  
**Cc:** Berthier, Jacinta; Docherty, Verna; MacDonald, Carl  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Charlene, when RM completes the boxes in the form and add any conditions as Science has, the completed form should be sent around for sign off by RDs, before going to the RDG. Thx

*Annette*

**From:** Vézina, Alain  
**Sent:** Monday, May 28, 2018 7:08 AM  
**To:** Daley, Annette <[Annette.Daley@dfo-mpo.gc.ca](mailto:Annette.Daley@dfo-mpo.gc.ca)>  
**Cc:** Berthier, Jacinta <[Jacinta.Berthier@dfo-mpo.gc.ca](mailto:Jacinta.Berthier@dfo-mpo.gc.ca)>; Docherty, Verna <[Verna.Docherty@dfo-mpo.gc.ca](mailto:Verna.Docherty@dfo-mpo.gc.ca)>; MacDonald, Carl <[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca)>; Licence Maritimes / Permis Maritimes (DFO/MPO) <[RegionalLicensing.XMAR@dfo-mpo.gc.ca](mailto:RegionalLicensing.XMAR@dfo-mpo.gc.ca)>; Herbert, Glen <[Glen.Herbert@dfo-mpo.gc.ca](mailto:Glen.Herbert@dfo-mpo.gc.ca)>; Pye, Brad <[Brad.Pye@dfo-mpo.gc.ca](mailto:Brad.Pye@dfo-mpo.gc.ca)>; King, Rhea L <[Rhea.King@dfo-mpo.gc.ca](mailto:Rhea.King@dfo-mpo.gc.ca)>; Lambert, Robert <[Robert.Lambert@dfo-mpo.gc.ca](mailto:Robert.Lambert@dfo-mpo.gc.ca)>  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Thanks Annette,

From Science's perspective, conditions that flow from my concerns are those that are generally applied by coastal states under the UNCLOS MSR guidelines, i.e.

A preliminary report is submitted to <appropriate office in GAC> no later than x months after the end date of the authorized mission.

A copy of all the data collected during the marine scientific research activities is provided to us.

A copy of the final report produced that incorporates information obtained from the marine scientific research is provided to us no later than x years after the end of the mission.

These are the conditions that are imposed on us when we ask for permission to operate in US waters. I have no idea what GAC requires already in their consent letter and if these conditions are included. If they are, fine. If not, this is the minimum we need to do to ensure that we do our due diligence.

**IMPORTANT:** [REDACTED] RM also has some serious questions about use of bait, coordination with Canadian research, etc .... that should be turned into conditions. Also how will we ensure that the observer condition on the SARA permit is met? [REDACTED]

Alain

**From:** Daley, Annette

**Sent:** May 25, 2018 4:33 PM

**To:** Vézina, Alain <Alain.Vezina@dfo-mpo.gc.ca>

**Cc:** Berthier, Jacinta <Jacinta.Berthier@dfo-mpo.gc.ca>; Docherty, Verna <Verna.Docherty@dfo-mpo.gc.ca>;

MacDonald, Carl <Carl.MacDonald@dfo-mpo.gc.ca>; Licence Maritimes / Permis Maritimes (DFO/MPO)

<RegionalLicensing.XMAR@dfo-mpo.gc.ca>; Herbert, Glen <Glen.Herbert@dfo-mpo.gc.ca>; Pye, Brad <Brad.Pye@dfo-

mpo.gc.ca>; King, Rhea L <Rhea.King@dfo-mpo.gc.ca>; Lambert, Robert <Robert.Lambert@dfo-mpo.gc.ca>

**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Alain and Rhea - The recommendation has not gone back to Global Affairs so Oearch has not been informed. Therefore we will go back around with the review process and perhaps Alain, there is a section in the form to add conditions that would be required to be met under the RDGs signature if we wanted to go that route rather than denying the application. Apparently NL is authorizing some work in Placentia Bay.

*Annette*

**From:** Vézina, Alain

**Sent:** Wednesday, May 23, 2018 1:37 PM

**To:** MacDonald, Carl <Carl.MacDonald@dfo-mpo.gc.ca>; Licence Maritimes / Permis Maritimes (DFO/MPO)

<RegionalLicensing.XMAR@dfo-mpo.gc.ca>; Herbert, Glen <Glen.Herbert@dfo-mpo.gc.ca>; Pye, Brad <Brad.Pye@dfo-mpo.gc.ca>

**Cc:** Daley, Annette <Annette.Daley@dfo-mpo.gc.ca>; Berthier, Jacinta <Jacinta.Berthier@dfo-mpo.gc.ca>

**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

With respect to the questions on the science section of the approval form:

This research activity will **not** contribute to the Canadian scientific community. Canadian collaborators do not see the benefit of working with Oearch, even though they have contacted all major Atlantic Universities (Dal, Memorial, Acadia etc), DFO (Heather Bowlby, Mark Simpson), non-profits (Grand Manan Seabird and Whale Research), OTN over the last 2 years. As pointed out by Carl, Heather holds a SARA permit and has an equivalent tagging program for white shark (aka duplication of research effort on a single population of an endangered species). The area that Heather works out of is the outside of St. Margret's Bay or immediately adjacent to Mahone Bay. The main tag type they use is optimized for instantaneous geolocation (excellent opportunities for twitter) but gives no information on habitat use – as needed for SARA research questions.

Canadian scientists will **not** have access to the research data. [REDACTED]



Based on this information, I cannot recommend approval at this time. The amended approval form is attached.

Although I did not change the response in the form, I have no record of a previous approval for this organization.

Outside of my purview, but I understand that the SARA permit requires a DFO observer during at least part of their trip. How will that condition be fulfilled?

Alain

**From:** MacDonald, Carl

**Sent:** May 23, 2018 10:32 AM

**To:** Licence Maritimes / Permis Maritimes (DFO/MPO) <RegionalLicensing.XMAR@dfo-mpo.gc.ca>; Vézina, Alain <Alain.Vezina@dfo-mpo.gc.ca>; Herbert, Glen <Glen.Herbert@dfo-mpo.gc.ca>; Pye, Brad <Brad.Pye@dfo-mpo.gc.ca>

**Cc:** Daley, Annette <Annette.Daley@dfo-mpo.gc.ca>; Berthier, Jacinta <Jacinta.Berthier@dfo-mpo.gc.ca>

**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Questions/Comments Regarding Proposed Research:

- Would it be possible for the researcher to describe the bait type they propose to use? ie Will the researcher be using Marine Mammal parts for Bait? If so, where will this Marine Mammal bait be acquired?
- Would it be possible for the researcher to be more specific regarding the shark species intended for this research? Currently the document only indicates Shark Species - including White Shark.
- It is important to note that Canadian shark researcher (Heather Bowlby) has been approved to conducted research on the same species (White Shark) in the same area (Mahone Bay).

Regards,

Carl MacDonald

Resource Management

Fisheries & Oceans Canada | Government of Canada

[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca) | Tel: 902-293-8257 | Fax: 902-426-7967

Regional agent principal de gestion des peches, Gestion des ressources

Pêches et Océans Canada | Gouvernement du Canada

[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca) | Tél: 902-293-8257 | Télécopieur: 902-426-7967

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**From:** MacDonald, Carl

**Sent:** 2018-May-22 4:06 PM

**To:** Licence Maritimes / Permis Maritimes (DFO/MPO); Vézina, Alain; Herbert, Glen; Pye, Brad

**Cc:** Daley, Annette

**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Large Pelagic Comments:

1. *Large pelagic sector.* Pelagic longline fishing takes place along the edge of the Scotian Shelf where the large pelagic fleet conducts operations. Caution must be taken to ensure that the scientific research

vessel does not cross previously deployed pelagic longlines which run near the surface for distances of 30 - 40 nm. Damaged gear and identifying marks are to be reported to DFO ([Brad.Pye@dfo-mpo.gc.ca](mailto:Brad.Pye@dfo-mpo.gc.ca)) immediately. Vessel is to continuously broadcast an AIS signal.

- Swordfish longline gear may be in other areas.
- Pelagic Longline Gear have AIS beacons attached.
- Beacons from a licence holder have the same vessel prefix on each beacon ( [REDACTED] )
- There will be a string of beacons on a line. It is not possible to travel between the beacons with the research vessel.
- It is possible to travel a suitable distance alongside a pelagic longline set.

Regards,

Carl MacDonald  
Resource Management  
Fisheries & Oceans Canada | Government of Canada  
[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca) | Tel: 902-293-8257 | Fax: 902-426-7967

Regional agent principal de gestion des peches, Gestion des ressources  
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[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca) | Tél: 902-293-8257 | Télécopieur: 902-426-7967

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**From:** Licence Maritimes / Permis Maritimes (DFO/MPO)  
**Sent:** 2018-May-18 10:24 AM  
**To:** Vézina, Alain; Herbert, Glen; Pye, Brad; MacDonald, Carl  
**Cc:** Daley, Annette  
**Subject:** FW: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)  
**Importance:** High

Good morning – the response time has been changed to **June 1<sup>st</sup>** instead of the original August 1<sup>st</sup> request.

Please review and provide comments/approval for the attached Foreign Vessel Cruise for Scientific Research (Shark species including White Shark).

I have asked NCR to have the applicant provide us with a Map of the Area to be studied, as the areas are only recorded under section 3 of the application. Placentia Bay, Nfld is listed, but as we do not licence vessels for other waters, I will notify Nfld licensing that this application will be reviewed and no doubt, approved for our waters. If Nfld requests that Placentia Bay be included, we will do that.

Thanks and have a nice day!

Charlene Cleveland  
Regional Officer, Licensing Services  
Dept of Fisheries & Oceans  
Dartmouth, Nova Scotia  
Tel: (902) 426-9966  
Fax: (902) 426-5010  
[Licence.maritimes.permis@dfo-mpo.gc.ca](mailto:Licence.maritimes.permis@dfo-mpo.gc.ca)

---

**From:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO)

**Sent:** 2017–November-30 1:14 PM

**To:** Licence Maritimes / Permis Maritimes (DFO/MPO); Duggan, Charmaine; Kean, Jackie; Bowdring, Tony

**Cc:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO); Lavigne, Élise; Farr, Connie; Chmiel, Jim;  
[HlxEcareg1@innav.gc.ca](mailto:HlxEcareg1@innav.gc.ca)

**Subject:** IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Good afternoon,

Please see attached US Marine Scientific Research (MSR) request for the **OCEARCH, Sep 1 – Oct 31, 2018**. It appears as though the proponent intends to conduct work in both Newfoundland and Maritimes Regions (though primarily in Maritimes).

The vessel intends to call on Halifax, NS, between **Sep 9 – Oct 31, 2018**, for provisioning.

We kindly request all responses by **August 1, 2018**.

Best wishes,

Andrew

**Cleveland, Charlene**

---

**From:** Daley, Annette  
**Sent:** 2018-June-08 2:03 PM  
**To:** Docherty, Verna; Licence Maritimes / Permis Maritimes (DFO/MPO)  
**Subject:** Pls note: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

**Follow Up Flag:** Follow up  
**Flag Status:** Completed

*Annette*

**From:** MacDonald, Carl  
**Sent:** Friday, June 8, 2018 11:17 AM  
**To:** Berthier, Jacinta <Jacinta.Berthier@dfo-mpo.gc.ca>; Daley, Annette <Annette.Daley@dfo-mpo.gc.ca>  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Hi Jacinta and Annette,

  
She is fine with the other conditions.

  
Regards,

Carl MacDonald  
Resource Management  
Fisheries & Oceans Canada | Government of Canada  
[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca) | Tel: 902-293-8257 | Fax: 902-426-7967

Regional agent principal de gestion des peches, Gestion des ressources  
Pêches et Océans Canada | Gouvernement du Canada  
[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca) | Tél: 902-293-8257 | Télécopieur: 902-426-7967

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**From:** Berthier, Jacinta  
**Sent:** 2018-June-07 5:11 PM  
**To:** MacDonald, Carl; Daley, Annette  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Hi Carl,

I concur with the conditions, and expect that Science has reviewed these as well?

Thanks,  
JB

**From:** MacDonald, Carl

**Sent:** Wednesday, June 6, 2018 3:01 PM

**To:** Berthier, Jacinta <[Jacinta.Berthier@dfo-mpo.gc.ca](mailto:Jacinta.Berthier@dfo-mpo.gc.ca)>; Daley, Annette <[Annette.Daley@dfo-mpo.gc.ca](mailto:Annette.Daley@dfo-mpo.gc.ca)>

**Cc:** Docherty, Verna <[Verna.Docherty@dfo-mpo.gc.ca](mailto:Verna.Docherty@dfo-mpo.gc.ca)>; Licence Maritimes / Permis Maritimes (DFO/MPO) <[RegionalLicensing.XMAR@dfo-mpo.gc.ca](mailto:RegionalLicensing.XMAR@dfo-mpo.gc.ca)>

**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Hi Jacinta and Annette,

Below are my suggested RM changes to Oearch request.

Please concur or alter as required in order to proceed with RDG approval.

Conditions to add to licence.

- The licence holder is authorized to conduct research on the following shark species: White shark, Blue Shark, Porbeagle Shark, Common Thresher Shark, and Shortfin Mako Shark.
- Marine mammal parts may not be offered to sharks for feeding or consumption, may not be ingested by sharks, and pieces of marine mammal tissue may not be thrown overboard to attract sharks.
- Efforts to lure, capture, or tag sharks is not authorized to occur in close proximity (within two nautical miles) of endangered whale species, including North Atlantic Right Whales (*Eubalaena glacialis*).

Regards,

Carl MacDonald  
Resource Management  
Fisheries & Oceans Canada | Government of Canada  
[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca) | Tel: 902-293-8257 | Fax: 902-426-7967

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Pêches et Océans Canada | Gouvernement du Canada  
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---

**From:** Licence Maritimes / Permis Maritimes (DFO/MPO)  
**Sent:** 2018-June-04 4:20 PM  
**To:** Docherty, Verna; MacDonald, Carl  
**Subject:** FW: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Good afternoon – received this response to our request for additional information (Map for Cruse Track, Bait to be used and list of Shark Species)

I have the Foreign Vessel Application ready to go to the RD for signature (approval) and then to the RDG.

Please advise if you require any changes to this document.

Charlene Cleveland  
Licensing Officer  
Maritimes Region – Dartmouth  
Phone: 902-426-1929  
[Charlene.cleveland@dfo-mpo.gc.ca](mailto:Charlene.cleveland@dfo-mpo.gc.ca)

---

**From:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO)  
**Sent:** 2018-June-04 10:18 AM  
**To:** Licence Maritimes / Permis Maritimes (DFO/MPO)  
**Cc:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO)  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Good morning,

I've received the following in response to the below mentioned requests:

I have answered your questions below **in bold print** and have attached six relevant documents that should assist with providing more information for our request. These attached docs are:

1. Our full permit application to Canada DFO for a Species At Risk Act (SARA) permit.
2. Additional information that was provided to DFO for the SARA permit.
3. A table comparing two capture methods for large sharks and the scientific productivity of each.
4. Our granted SARA permit from DFO for the Maritimes Region.
5. Our granted SARA permit from DFO for Newfoundland.
6. Our authorization letter from NOAA for the use of marine mammal material in our related shark research in U.S. waters.

I refer to some of these documents in the answers to your questions below. Please refer to these docs for further information and I would be happy to clarify any points or provide additional information as needed. If a phone call will help, my direct office line is below and my cell number is [REDACTED] Thanks so much for your assistance, it is much appreciated.

Best regards,

Dr. Bob Hueter

Additionally to the request that the proponents **provide a map of the proposed cruise track for inclusion in the application**, I have received a request for more information regarding the U.S. MSR for the OCEARCH (F2017-120):

**There is no "cruise track" per se for this expedition as we are not following a line transect but instead are sampling in certain key areas in Canadian waters. Please see attached doc #1 which contains a map of the SARA-permitted areas to sample on page 42 of the pdf. We will begin our work in the Mahone Bay region, where we know from our own satellite tracking data that large white sharks have traveled. We will move our operation as necessary to obtain the sample size of sharks we seek, as per the map shown in doc #1. If we are successful in Mahone Bay, we will not need to move to the other areas.**

- Would it be possible for the researcher to describe the bait type they propose to use? ie Will the researcher be using Marine Mammal parts for Bait? If so, where will this Marine Mammal bait be acquired?

**In U.S. waters we use marine mammal material obtained from dead, stranded baleen whales, provided to us by the Marine Mammal Response Network here under NOAA authorization shown in attached doc #6. The methods we use are described in attached docs #1, 2 and 6. We use marine mammal material as chum and bait to attract the white sharks in the area to our fishing boat, but do not allow the sharks to ingest the marine mammal bait. We cannot use marine mammal material obtained in U.S. waters in Canadian waters, so we are in the process of obtaining a similar authorization to obtain, possess and use marine mammal material in Canadian waters from DFO's Fisheries Management Branch. We sometimes use non-marine mammal material, such as small tuna species, to attract the sharks, but this is far less effective than blubber and other material from baleen whales, on which the white sharks naturally feed.**

- Would it be possible for the researcher to be more specific regarding the shark species intended for this research? Currently the document only indicates Shark Species - including White Shark.

**This expedition is targeting white sharks (*Carcharodon carcharias*). It is possible we will encounter other shark species in Canadian waters and we could sample and tag those species for Canadian collaborators if desired. Those species could include blue, porbeagle, thresher, or shortfin mako sharks. Any of these and other species could be sampled, tagged and released alive. However, if there are any permitting concerns for these other shark species, we can avoid any interactions with them and focus solely on the white shark.**

- It is important to note that Canadian shark researcher (Heather Bowlby) has been approved to conduct research on the same species (White Shark) in the same area (Mahone Bay).

**We have previously reached out to Dr. Bowlby and had productive email exchanges with her about collaboration, but that was well before we had obtained our SARA permit, and she did not commit to collaborate until we were authorized for our research in Canada. Now that we have our SARA permits, we will re-connect with her and offer to collaborate in any way she would like. Our goal is to engage with as many Canadian researchers as possible in this expedition. That is the OCEARCH model, to enable local capacity to conduct innovative studies of these large sharks through open collaboration of teams of researchers and students. We believe that Dr. Bowlby does not have access to a research ship similar to the M/V OCEARCH for her white shark research, and therefore we hope she accepts our offer of free shiptime to work collaboratively with us, as we are all working to solve similar questions in white shark biology and conservation.**

Please let me know if any further clarification is needed.

Best,

Andrew

---

**From:** Licence Maritimes / Permis Maritimes (DFO/MPO)  
**Sent:** May-30-18 12:36 PM  
**To:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO)  
**Subject:** FW: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)  
**Importance:** High

Good afternoon – as we are still working on revisiting this Foreign Vessel application for the above US vessel - Ocearch, and as per the e-mail below from Carl MacDonald, Senior Resource Manager, please have the applicant provide a **complete list of Shark species** that they will conducting research on. (highlighted in yellow)

The approval process will not move forward until this information is received and well as the previous requests for **additional information** is received (**map of research area and the bait description**)

Regards,

Charlene Cleveland  
Regional Officer, Licensing Services  
Dept of Fisheries & Oceans  
Dartmouth, Nova Scotia  
Tel: (902) 426-9966  
Fax: (902) 426-5010  
[Licence.maritimes.permis@dfo-mpo.gc.ca](mailto:Licence.maritimes.permis@dfo-mpo.gc.ca)

---

**From:** MacDonald, Carl  
**Sent:** 2018-May-28 9:58 AM  
**To:** Daley, Annette; Berthier, Jacinta  
**Cc:** Docherty, Verna; Licence Maritimes / Permis Maritimes (DFO/MPO)  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Hi Annette and Jacinta,

For your consideration

**DFO Requests the proponent to specify the shark species intended for this research. Currently the proponent only indicates Shark Species - including White Shark. Proponent is to list all species (sharks) they are conducting research on. When we know all the species – a condition can be added to specify these are the only shark species authorized to conduct research on.**

Conditions

- Marine mammal parts may not be offered to sharks for feeding or consumption, will not be ingested by sharks, and pieces of marine mammal tissue will not be thrown overboard to attract sharks.
- Efforts to lure, capture, or tag sharks will not occur in close proximity (within two nautical miles) of endangered whale species, including North Atlantic Right Whales (*Eubalaena glacialis*).
- This licence does not authorize research in the area of Mahone Bay, Nova Scotia.



- The licence holder may be required to have an observer (at-sea) on board the vessel during any trip. When required to take an at-sea observer, the licence holder shall not depart from port until the at-sea observer is on board.

Regards,

Carl MacDonald  
Resource Management  
Fisheries & Oceans Canada | Government of Canada  
[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca) | Tel: 902-293-8257 | Fax: 902-426-7967

Regional agent principal de gestion des peches, Gestion des ressources  
Pêches et Océans Canada | Gouvernement du Canada  
[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca) | Tél: 902-293-8257 | Télécopieur: 902-426-7967

---

**From:** Daley, Annette  
**Sent:** 2018-May-28 8:54 AM  
**To:** Licence Maritimes / Permis Maritimes (DFO/MPO)  
**Cc:** Berthier, Jacinta; Docherty, Verna; MacDonald, Carl  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Charlene, when RM completes the boxes in the form and add any conditions as Science has, the completed form should be sent around for sign off by RDs, before going to the RDG. Thx

*Annette*

**From:** Vézina, Alain  
**Sent:** Monday, May 28, 2018 7:08 AM  
**To:** Daley, Annette <[Annette.Daley@dfo-mpo.gc.ca](mailto:Annette.Daley@dfo-mpo.gc.ca)>  
**Cc:** Berthier, Jacinta <[Jacinta.Berthier@dfo-mpo.gc.ca](mailto:Jacinta.Berthier@dfo-mpo.gc.ca)>; Docherty, Verna <[Verna.Docherty@dfo-mpo.gc.ca](mailto:Verna.Docherty@dfo-mpo.gc.ca)>; MacDonald, Carl <[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca)>; Licence Maritimes / Permis Maritimes (DFO/MPO) <[RegionalLicensing.XMAR@dfo-mpo.gc.ca](mailto:RegionalLicensing.XMAR@dfo-mpo.gc.ca)>; Herbert, Glen <[Glen.Herbert@dfo-mpo.gc.ca](mailto:Glen.Herbert@dfo-mpo.gc.ca)>; Pye, Brad <[Brad.Pye@dfo-mpo.gc.ca](mailto:Brad.Pye@dfo-mpo.gc.ca)>; King, Rhea L <[Rhea.King@dfo-mpo.gc.ca](mailto:Rhea.King@dfo-mpo.gc.ca)>; Lambert, Robert <[Robert.Lambert@dfo-mpo.gc.ca](mailto:Robert.Lambert@dfo-mpo.gc.ca)>  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Thanks Annette,

From Science's perspective, conditions that flow from my concerns are those that are generally applied by coastal states under the UNCLOS MSR guidelines, i.e.

A preliminary report is submitted to <appropriate office in GAC> no later than x months after the end date of the authorized mission.

A copy of all the data collected during the marine scientific research activities is provided to us.  
A copy of the final report produced that incorporates information obtained from the marine scientific research is provided to us no later than x years after the end of the mission.

These are the conditions that are imposed on us when we ask for permission to operate in US waters. I have no idea what GAC requires already in their consent letter and if these conditions are included. If they are, fine. If not, this is the minimum we need to do to ensure that we do our due diligence.

**IMPORTANT:** [REDACTED] RM also has some serious questions about use of bait, coordination with Canadian research, etc .... that should be turned into conditions. Also how will we ensure that the observer condition on the SARA permit is met? [REDACTED]

Alain

**From:** Daley, Annette  
**Sent:** May 25, 2018 4:33 PM  
**To:** Vézina, Alain <[Alain.Vezina@dfo-mpo.gc.ca](mailto:Alain.Vezina@dfo-mpo.gc.ca)>  
**Cc:** Berthier, Jacinta <[Jacinta.Berthier@dfo-mpo.gc.ca](mailto:Jacinta.Berthier@dfo-mpo.gc.ca)>; Docherty, Verna <[Verna.Docherty@dfo-mpo.gc.ca](mailto:Verna.Docherty@dfo-mpo.gc.ca)>; MacDonald, Carl <[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca)>; Licence Maritimes / Permis Maritimes (DFO/MPO) <[RegionalLicensing.XMAR@dfo-mpo.gc.ca](mailto:RegionalLicensing.XMAR@dfo-mpo.gc.ca)>; Herbert, Glen <[Glen.Herbert@dfo-mpo.gc.ca](mailto:Glen.Herbert@dfo-mpo.gc.ca)>; Pye, Brad <[Brad.Pye@dfo-mpo.gc.ca](mailto:Brad.Pye@dfo-mpo.gc.ca)>; King, Rhea L <[Rhea.King@dfo-mpo.gc.ca](mailto:Rhea.King@dfo-mpo.gc.ca)>; Lambert, Robert <[Robert.Lambert@dfo-mpo.gc.ca](mailto:Robert.Lambert@dfo-mpo.gc.ca)>  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Alain and Rhea - The recommendation has not gone back to Global Affairs so Oearch has not been informed. Therefore we will go back around with the review process and perhaps Alain, there is a section in the form to add conditions that would be required to be met under the RDGs signature if we wanted to go that route rather than denying the application. Apparently NL is authorizing some work in Placentia Bay.

*Annette*

**From:** Vézina, Alain  
**Sent:** Wednesday, May 23, 2018 1:37 PM  
**To:** MacDonald, Carl <[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca)>; Licence Maritimes / Permis Maritimes (DFO/MPO) <[RegionalLicensing.XMAR@dfo-mpo.gc.ca](mailto:RegionalLicensing.XMAR@dfo-mpo.gc.ca)>; Herbert, Glen <[Glen.Herbert@dfo-mpo.gc.ca](mailto:Glen.Herbert@dfo-mpo.gc.ca)>; Pye, Brad <[Brad.Pye@dfo-mpo.gc.ca](mailto:Brad.Pye@dfo-mpo.gc.ca)>  
**Cc:** Daley, Annette <[Annette.Daley@dfo-mpo.gc.ca](mailto:Annette.Daley@dfo-mpo.gc.ca)>; Berthier, Jacinta <[Jacinta.Berthier@dfo-mpo.gc.ca](mailto:Jacinta.Berthier@dfo-mpo.gc.ca)>  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

With respect to the questions on the science section of the approval form:

This research activity will **not** contribute to the Canadian scientific community. Canadian collaborators do not see the benefit of working with Oearch, even though they have contacted all major Atlantic Universities (Dal, Memorial, Acadia etc), DFO (Heather Bowlby, Mark Simpson), non-profits (Grand Manan Seabird and Whale Research), OTN over the last 2 years. As pointed out by Carl, Heather holds a SARA permit and has an equivalent tagging program for white shark (aka duplication of research effort on a single population of an endangered species). The area that Heather works out of is the outside of St. Margret's Bay or immediately adjacent to Mahone Bay. The main tag type they use is optimized for instantaneous geolocation (excellent opportunities for twitter) but gives no information on habitat use – as needed for SARA research questions.

Canadian scientists will **not** have access to the research data.

Based on this information, I cannot recommend approval at this time. The amended approval form is attached.

Although I did not change the response in the form, I have no record of a previous approval for this organization.

Outside of my purview, but I understand that the SARA permit requires a DFO observer during at least part of their trip. How will that condition be fulfilled?

Alain

**From:** MacDonald, Carl

**Sent:** May 23, 2018 10:32 AM

**To:** Licence Maritimes / Permis Maritimes (DFO/MPO) <[RegionalLicensing.XMAR@dfo-mpo.gc.ca](mailto:RegionalLicensing.XMAR@dfo-mpo.gc.ca)>; Vézina, Alain <[Alain.Vezina@dfo-mpo.gc.ca](mailto:Alain.Vezina@dfo-mpo.gc.ca)>; Herbert, Glen <[Glen.Herbert@dfo-mpo.gc.ca](mailto:Glen.Herbert@dfo-mpo.gc.ca)>; Pye, Brad <[Brad.Pye@dfo-mpo.gc.ca](mailto:Brad.Pye@dfo-mpo.gc.ca)>

**Cc:** Daley, Annette <[Annette.Daley@dfo-mpo.gc.ca](mailto:Annette.Daley@dfo-mpo.gc.ca)>; Berthier, Jacinta <[Jacinta.Berthier@dfo-mpo.gc.ca](mailto:Jacinta.Berthier@dfo-mpo.gc.ca)>

**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

**Questions/Comments Regarding Proposed Research:**

- Would it be possible for the researcher to describe the bait type they propose to use? ie Will the researcher be using Marine Mammal parts for Bait? If so, where will this Marine Mammal bait be acquired?
- Would it be possible for the researcher to be more specific regarding the shark species intended for this research? Currently the document only indicates Shark Species - including White Shark.
- It is important to note that Canadian shark researcher (Heather Bowlby) has been approved to conducted research on the same species (White Shark) in the same area (Mahone Bay).

Regards,

Carl MacDonald

Resource Management

Fisheries & Oceans Canada | Government of Canada

[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca) | Tel: 902-293-8257 | Fax: 902-426-7967

Regional agent principal de gestion des pêches, Gestion des ressources

Pêches et Océans Canada | Gouvernement du Canada

[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca) | Tél: 902-293-8257 | Télécopieur: 902-426-7967

---

**From:** MacDonald, Carl

**Sent:** 2018-May-22 4:06 PM

**To:** Licence Maritimes / Permis Maritimes (DFO/MPO); Vézina, Alain; Herbert, Glen; Pye, Brad

**Cc:** Daley, Annette

**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

## Large Pelagic Comments:

1. *Large pelagic sector.* Pelagic longline fishing takes place along the edge of the Scotian Shelf where the large pelagic fleet conducts operations. Caution must be taken to ensure that the scientific research vessel does not cross previously deployed pelagic longlines which run near the surface for distances of 30 - 40 nm. Damaged gear and identifying marks are to be reported to DFO ([Brad.Pye@dfo-mpo.gc.ca](mailto:Brad.Pye@dfo-mpo.gc.ca)) immediately. Vessel is to continuously broadcast an AIS signal.
  - Swordfish longline gear may be in other areas.
  - Pelagic Longline Gear have AIS beacons attached.
  - Beacons from a licence holder have the same vessel prefix on each beacon [REDACTED]
  - There will be a string of beacons on a line. It is not possible to travel between the beacons with the research vessel.
  - It is possible to travel a suitable distance alongside a pelagic longline set.

Regards,

Carl MacDonald  
 Resource Management  
 Fisheries & Oceans Canada | Government of Canada  
[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca) | Tel: 902-293-8257 | Fax: 902-426-7967

Regional agent principal de gestion des peches, Gestion des ressources  
 Pêches et Océans Canada | Gouvernement du Canada  
[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca) | Tél: 902-293-8257 | Télécopieur: 902-426-7967

---

**From:** Licence Maritimes / Permis Maritimes (DFO/MPO)  
**Sent:** 2018-May-18 10:24 AM  
**To:** Vézina, Alain; Herbert, Glen; Pye, Brad; MacDonald, Carl  
**Cc:** Daley, Annette  
**Subject:** FW: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)  
**Importance:** High

Good morning – the response time has been changed to **June 1<sup>st</sup>** instead of the original **August 1<sup>st</sup>** request.

Please review and provide comments/approval for the attached Foreign Vessel Cruise for Scientific Research (Shark species including White Shark).

I have asked NCR to have the applicant provide us with a Map of the Area to be studied, as the areas are only recorded under section 3 of the application. Placentia Bay, Nfld is listed, but as we do not licence vessels for other waters, I will notify Nfld licensing that this application will be reviewed and no doubt, approved for our waters. If Nfld requests that Placentia Bay be included, we will do that.

Thanks and have a nice day!

Charlene Cleveland

Regional Officer, Licensing Services  
Dept of Fisheries & Oceans  
Dartmouth, Nova Scotia  
Tel: (902) 426-9966  
Fax: (902) 426-5010  
[Licence.maritimes.permis@dfo-mpo.gc.ca](mailto:Licence.maritimes.permis@dfo-mpo.gc.ca)

---

**From:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO)  
**Sent:** 2017–November-30 1:14 PM  
**To:** Licence Maritimes / Permis Maritimes (DFO/MPO); Duggan, Charmaine; Kean, Jackie; Bowdring, Tony  
**Cc:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO); Lavigne, Élise; Farr, Connie; Chmiel, Jim;  
[HlxEcareg1@innav.gc.ca](mailto:HlxEcareg1@innav.gc.ca)  
**Subject:** IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Good afternoon,

Please see attached US Marine Scientific Research (MSR) request for the **OCEARCH, Sep 1 – Oct 31, 2018**. It appears as though the proponent intends to conduct work in both Newfoundland and Maritimes Regions (though primarily in Maritimes).

The vessel intends to call on Halifax, NS, between **Sep 9 – Oct 31, 2018**, for provisioning.

We kindly request all responses by **August 1, 2018**.

Best wishes,

Andrew

## Cleveland, Charlene

---

**From:** Docherty, Verna  
**Sent:** 2018-June-11 2:17 PM  
**To:** Cleveland, Charlene  
**Subject:** RE: "Final Draft" - OCEARCH Licence

Looks great Charlene. Thanks for all the work on circulating this multiple times - I know sr. management appreciated it, as well.  
Verna

-----Original Message-----

From: Cleveland, Charlene  
Sent: June-11-18 1:54 PM  
To: Docherty, Verna  
Subject: "Final Draft" - OCEARCH Licence

Hi Verna - please review the attached final draft. If you are happy with this version, I will proceed with getting the application approval from the RD and RDG.

Thanks!

Charlene

-----Original Message-----

From: [dfo.donotreply-nepasrepondre.mpo@canada.ca](mailto:dfo.donotreply-nepasrepondre.mpo@canada.ca) [mailto:[dfo.donotreply-nepasrepondre.mpo@canada.ca](mailto:dfo.donotreply-nepasrepondre.mpo@canada.ca)]  
Sent: 2018-June-11 1:41 PM  
To: Cleveland, Charlene  
Subject: Message from "pmnsbiorh60684"

This E-mail was sent from "pmnsbiorh60684" (MP C5503).

Scan Date: 06.11.2018 13:40:39 (-0300)

Queries to: [dfo.donotreply-nepasrepondre.mpo@canada.ca](mailto:dfo.donotreply-nepasrepondre.mpo@canada.ca)

## **Cleveland, Charlene**

---

**From:** Licence Maritimes / Permis Maritimes (DFO/MPO)  
**Sent:** 2018-June-12 3:36 PM  
**To:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO); Duggan, Charmaine; Kean, Jackie; Bowdring, Tony  
**Cc:** Lavigne, Élise; Chmiel, Jim; HlxEcareg1@innav.gc.ca  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)  
**Attachments:** Ocearch (Sept 1 to Oct 31, 2018) - FFVLAF - Scientific Research.pdf  
  
**Importance:** High

Good afternoon – please find attached a copy of the signed and approved Foreign Fishing Vessel Licence Approval Form – Scientific Research for the US vessel OCEARCH, for cruise dates of September 1 to October 31, 2018.

The licence will be prepared with specific special conditions for this cruise, due to the type of research activities requested in the application. The licence will be created and issued to the agent, Chris Fischer, prior to the September 1, 2018 start date.

Regards,

Charlene Cleveland  
Regional Officer, Licensing Services  
Dept of Fisheries & Oceans  
Dartmouth, Nova Scotia  
Tel: (902) 426-9966  
Fax: (902) 426-5010  
[Licence.maritimes.permis@dfo-mpo.gc.ca](mailto:Licence.maritimes.permis@dfo-mpo.gc.ca)

---

**From:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO)  
**Sent:** 2018-May-01 3:42 PM  
**To:** Licence Maritimes / Permis Maritimes (DFO/MPO); Duggan, Charmaine; Kean, Jackie; Bowdring, Tony  
**Cc:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO); Lavigne, Élise; Farr, Connie; Chmiel, Jim; [HlxEcareg1@innav.gc.ca](mailto:HlxEcareg1@innav.gc.ca)  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Good afternoon,

We have received an inquiry from Global Affairs wondering if it would be possible to move up the return date for this application to June 1<sup>st</sup>.

Please advise me if this is likely to be possible.

Best,

Andrew

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**From:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO)

**Sent:** November-30-17 12:14 PM

**To:** Licence Maritimes / Permis Maritimes (DFO/MPO); Duggan, Charmaine; Kean, Jackie; Bowdring, Tony

**Cc:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO); Lavigne, Élise; Farr, Connie; Chmiel, Jim;  
[HlxEcareg1@innav.gc.ca](mailto:HlxEcareg1@innav.gc.ca)

**Subject:** IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Good afternoon,

Please see attached US Marine Scientific Research (MSR) request for the **OCEARCH, Sep 1 – Oct 31, 2018**. It appears as though the proponent intends to conduct work in both Newfoundland and Maritimes Regions (though primarily in Maritimes).

The vessel intends to call on Halifax, NS, between **Sep 9 – Oct 31, 2018**, for provisioning.

We kindly request all responses by **August 1, 2018**.

Best wishes,

Andrew



**Pages 624 to / à 629  
are duplicates of  
sont des duplicatas des  
pages 765 to / à 770**

**Merriman, Catherine B**

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**From:** Sweet, Marilyn  
**Sent:** June-14-18 11:30 AM  
**To:** Landry, Melissa; Kean, Jackie; Elliott, Isabelle; Mossman, Scott  
**Cc:** McRory, Jody; Gilchrist, Brett; Moore, Kendra  
**Subject:** RE: OCEARCH questions - right whale research connections, permits, in Canada

Okay. Thanks everyone. So from my viewpoint, I can tell them they are permitted to go ahead so long as it is not a species at risk, and any movement over provincial lines requires a MMTL.

Thanks everyone!

Mar

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**From:** Landry, Melissa  
**Sent:** June-14-18 11:26 AM  
**To:** Sweet, Marilyn; Kean, Jackie; Elliott, Isabelle; Mossman, Scott  
**Cc:** McRory, Jody; Gilchrist, Brett; Moore, Kendra  
**Subject:** RE: OCEARCH questions - right whale research connections, permits, in Canada

If they are just finding parts on the beach and not collecting parts from a live animal "fishing" then we don't have a licence requirement unless it is a SAR listed species. For the transportation between provinces, yes, they would require a MMTL.

Melissa

**Melissa S Landry B.Sc, M.M.M.**

Senior Officer | Marine Mammals / Species at Risk (NCR)  
 Agente Principale | Mammifères Marins / Espèces en Péril (RCN)  
 Ecosystems & Fisheries Management / Gestion des écosystèmes et des pêches  
 Fisheries and Oceans Canada / Pêches et Océans Canada  
 200 Kent Street | 200 rue Kent, Ottawa (ON) K1A 0E6  
 Tel: (613)-852-5619

Government of Canada | Gouvernement du Canada

*Marine Mammal and Sea Turtles Website*  
<http://www.dfo-mpo.gc.ca/fm-gp/mammals-mammiferes/index-eng.htm>

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**From:** Sweet, Marilyn  
**Sent:** Thursday, June 14, 2018 9:24 AM  
**To:** Kean, Jackie <Jackie.Kean@dfo-mpo.gc.ca>; Elliott, Isabelle <Isabelle.Elliott@dfo-mpo.gc.ca>; Landry, Melissa <Melissa.Landry@dfo-mpo.gc.ca>; Mossman, Scott <Scott.Mossman@dfo-mpo.gc.ca>  
**Subject:** Re: OCEARCH questions - right whale research connections, permits, in Canada

But not from us for the MM parts. They are getting one for the shark research, but they wouldn't need one for the MM parts collection. Right?

Sent from my BlackBerry 10 smartphone on the Bell network.

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**From:** Kean, Jackie

**Sent:** Thursday, June 14, 2018 10:22

**To:** Elliott, Isabelle; Sweet, Marilyn; Landry, Melissa; Mossman, Scott

**Subject:** RE: OCEARCH questions - right whale research connections, permits, in Canada

Transport licence to go from one province to another.

I think they need section 52 as they conducting this for scientific purposes.

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**From:** Elliott, Isabelle

**Sent:** June-14-18 9:47 AM

**To:** Sweet, Marilyn; Landry, Melissa; Kean, Jackie; Mossman, Scott

**Subject:** Re: OCEARCH questions - right whale research connections, permits, in Canada

That is my understanding.

Sent from my BlackBerry 10 smartphone on the Rogers network.

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**From:** Sweet, Marilyn

**Sent:** Thursday, June 14, 2018 7:29 AM

**To:** Elliott, Isabelle; Landry, Melissa; Kean, Jackie; Mossman, Scott

**Subject:** RE: OCEARCH questions - right whale research connections, permits, in Canada

Hi everyone,

Just wanted to check with you all to see if I'm on the right page on this request. This group from the US is coming up to do shark research and wants to know about using baleen whale parts from carcasses that wash up on shore.

From what I understand, unless it is a species at risk, they do not need a permit to have or use MM parts for a study such as this. They would need a MM transportation licence if going across provincial borders, but I could not issue that in advance. Would only be when they have the materials so we would know the species, etc.

In terms of them getting material from freezers, they would be on their own there to find people with samples.

Any thoughts or concerns? They do not need a section 52 for this activity as far as I can tell?

Mar

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**From:** Robert Hueter [<mailto:rhueter@mote.org>]

**Sent:** June-07-18 10:08 AM

**To:** Sweet, Marilyn; Hastings, Katherine

**Cc:** Chris Fischer; [ameite@oearch.org](mailto:ameite@oearch.org)

**Subject:** Re: OCEARCH questions - right whale research connections, permits, in Canada

Hi Marilyn:

Totally understand, the right whale situation is horrendous, among other things on your plate. Please excuse the "American" pushiness!... but we know these things take time to get approved, and our clock is ticking.

I can send you whatever documents you need, including our full project descriptions, SARA permit application and subsequent permits, related NOAA permits, etc. But for now, let me first answer your questions very briefly to get this started:

- Our project involves a mid-September to mid-October 2018 research expedition off Nova Scotia and Newfoundland to find, capture, sample, tag and release white sharks in Atlantic Canada waters. Our satellite telemetry from mature female and male white sharks has led us to your waters as a possible site for mating of this species. Our nonprofit research and education organization OCEARCH ([www.ocearch.org](http://www.ocearch.org)) has conducted this type of research all over the world, but currently we are focused on the North Atlantic white shark population. We have already received our SARA permits from DFO for this research. To attract the sharks to our vessel, we use marine mammal material from stranded, dead baleen whales whenever possible, as that is what the sharks really home in on. We do not feed the whale blubber to the sharks, we only use it to attract the sharks to our boat for temporary capture.
- In US waters, we are permitted by NOAA to receive marine mammal material from the Stranding Networks and deploy it in our research according to NOAA guidelines, which I can send to you. We are prohibited by NOAA from transporting marine mammal material across international boundaries, due to CITES concerns. So in Canada, we must obtain material opportunistically from your Atlantic stranding network. Hopefully there is material stored in freezers somewhere that we could utilize. Baleen whale blubber is what works the best, without question.
- So, we need a permit to both obtain and deploy this material in Atlantic Canada waters, in both your federal waters and your provincial waters off Nova Scotia and Newfoundland. We plan to begin our work in Mahone Bay NS, as that is the area with the most promise as indicated by our telemetry data and other reports.

I am happy to jump on the phone with you and discuss any other aspects of this that you need. And am ready to send you whatever documents you require, but didn't want to flood you with unnecessary paperwork. Standing by, very grateful for your assistance...

Bob

**ROBERT E. HUETER, Ph.D.**

*Chief Science Advisor, OCEARCH*

*Senior Scientist & Director, Center for Shark Research*

*Perry W. Gilbert Chair in Shark Research*

*Manager, Sharks & Rays Conservation Research Program*

*Mote Marine Laboratory*

*1600 Ken Thompson Parkway*

*Sarasota, FL 34236 USA*

[rhuetter@mote.org](mailto:rhuetter@mote.org)

Tel: 941-388-1827

Fax: 941-388-4312

More info at: [www.mote.org](http://www.mote.org)

On 6/7/2018 7:05 AM, Sweet, Marilyn wrote:

Hi Bob,

Sorry, things are very busy on the marine mammal file as you can imagine.

Can you please send me more of a description of the project you are working on. Where would you be getting the marine mammal parts? Is it opportunistic? Are you bringing some from the US to Canada? Are you transporting across provincial borders? What species are you looking at using? If I had more of a project description I would be able to provide better direction on what permits may be required.

Thank you,

Mar

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**From:** Robert Hueter [<mailto:rhuetter@mote.org>]  
**Sent:** June-07-18 7:54 AM  
**To:** Sweet, Marilyn; Hastings, Katherine  
**Cc:** Chris Fischer; [ameite@oceanarch.org](mailto:ameite@oceanarch.org)  
**Subject:** Re: OCEARCH questions - right whale research connections, permits, in Canada

Thanks Katie. Marilyn I'm happy to schedule a phone call with you today to discuss our request. Chris is on expedition now and out of range. But we know that time is of the essence, as these processes take time and our Canada research trip is only about three months away.

Bob Hueter

On Jun 7, 2018, at 6:42 AM, Hastings, Katherine <[Katherine.Hastings@dfo-mpo.gc.ca](mailto:Katherine.Hastings@dfo-mpo.gc.ca)> wrote:

Hi Bob,

Marilyn Sweet (cc'd) was in touch with you and Chris on May 25<sup>th</sup> to acknowledge receipt of your request. She is juggling a lot of priorities right now, and may not have had a chance yet to address your inquiry, but she is aware, and I am sure will do what she can to address it as soon as possible.

Best,  
Katie

---

**From:** Robert Hueter [<mailto:rhuetter@mote.org>]  
**Sent:** June-06-18 5:34 PM  
**To:** Hastings, Katherine  
**Subject:** Re: OCEARCH questions - right whale research connections, permits, in Canada

Katie, we have still not heard from the advisor you mention in your past emails. It's been more than a week since the Tuesday you last said we would be called by.

Can you please help us connect with this person ASAP? Thank you for your help!

Bob

**ROBERT E. HUETER, Ph.D.**  
*Senior Scientist & Director, Center for Shark Research*

*Perry W. Gilbert Chair in Shark Research  
Manager, Sharks & Rays Conservation Research Program  
Mote Marine Laboratory  
1600 Ken Thompson Parkway  
Sarasota, FL 34236 USA*

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[rhuetter@mote.org](mailto:rhuetter@mote.org)  
Tel: 941-388-1827  
Fax: 941-388-4312  
More info at: [www.mote.org](http://www.mote.org)

On 5/25/2018 11:50 AM, Hastings, Katherine wrote:

Hi Bob,

I have followed up with the advisor responsible. I hope and trust you will have a response by Tuesday if not before.

Thanks,  
Katie

---

**From:** Robert Hueter [<mailto:rhuetter@mote.org>]  
**Sent:** May-25-18 12:30 PM  
**To:** Hastings, Katherine  
**Cc:** Merriman, Catherine B; [chris@oceanarch.org](mailto:chris@oceanarch.org); Moors-Murphy, Hilary; Gromack, Aimee; [ameite@oceanarch.org](mailto:ameite@oceanarch.org); Vanderlaan, Angella S.; MacDonald, Jennifer  
**Subject:** Re: OCEARCH questions - right whale research connections, permits, in Canada

Dear Katie:

I did not hear anything back on this this week. [REDACTED]  
[REDACTED] this Monday is a national holiday, so I'd appreciate it if you could see if we could get a response next Tuesday-Wednesday.

Thank you -

Bob

**ROBERT E. HUETER, Ph.D.**  
*Senior Scientist & Director, Center for Shark Research  
Perry W. Gilbert Chair in Shark Research  
Manager, Sharks & Rays Conservation Research Program  
Mote Marine Laboratory  
1600 Ken Thompson Parkway  
Sarasota, FL 34236 USA*

[rhuetter@mote.org](mailto:rhuetter@mote.org)  
Tel: 941-388-1827  
Fax: 941-388-4312  
More info at: [www.mote.org](http://www.mote.org)

On 5/17/2018 12:34 PM, Hastings, Katherine wrote:

Hi Bob,

The urgency of your request has been conveyed to the appropriate advisors. If you have not heard anything further by next week (note that Monday is a holiday in Canada), please let me know and I will follow up on your behalf.

Thanks,  
Katie

---

**From:** Robert Hueter [<mailto:rhueter@mote.org>]  
**Sent:** May-17-18 11:36 AM  
**To:** Hastings, Katherine  
**Cc:** Merriman, Catherine B; [chris@oceanarch.org](mailto:chris@oceanarch.org); Moors-Murphy, Hilary; Gromack, Aimee; [ameite@oceanarch.org](mailto:ameite@oceanarch.org); Vanderlaan, Angelia S.; MacDonald, Jennifer  
**Subject:** Re: OCEARCH questions - right whale research connections, permits, in Canada

OK Katie, please we need to move on this quickly, as we realize the permitting process can take some time and our expedition is planned for September. Attached is the analogous permit granted to us by NOAA, feel free to provide this up the line to the proper authorities for their information to assist.

Standing by -

Bob

**ROBERT E. HUETER, Ph.D.**

*Senior Scientist & Director, Center for Shark Research  
Perry W. Gilbert Chair in Shark Research  
Manager, Sharks & Rays Conservation Research Program  
Mote Marine Laboratory  
1600 Ken Thompson Parkway  
Sarasota, FL 34236 USA*

[rhueter@mote.org](mailto:rhueter@mote.org)  
Tel: 941-388-1827  
Fax: 941-388-4312  
More info at: [www.mote.org](http://www.mote.org)

On 5/17/2018 9:51 AM, Hastings, Katherine wrote:

Hi Bob,

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That falls under the mandate of our Fisheries Management Branch. I have spoken with them, and they will be in touch soon with more details.

Katie

---

**From:** Robert Hueter  
[mailto:[rhuetter@mote.org](mailto:rhuetter@mote.org)]  
**Sent:** May-17-18 10:27 AM  
**To:** Hastings, Katherine  
**Cc:** Merriman, Catherine B;  
[chris@oceanarch.org](mailto:chris@oceanarch.org); Moors-Murphy,  
Hilary; Gromack, Aimee;  
[ameite@oceanarch.org](mailto:ameite@oceanarch.org); Vanderlaan,  
Angelia S.  
**Subject:** Re: OCEARCH questions -  
right whale research connections,  
permits, in Canada

Thanks Katie, we're looking to connect with those who can assist us with obtaining a marine mammal permit and whale blubber from dead, stranded animals, to attract white sharks for our research, analogous to our NOAA permit and contacts within the NE US Stranding Network. Who is best to discuss that with us? We already have our SARA permit for the white shark research using these methods.

Bob Hueter



On May 17, 2018, at 8:43 AM, Hastings, Katherine <[Katherine.Hastings@dfo-mpo.gc.ca](mailto:Katherine.Hastings@dfo-mpo.gc.ca)> wrote:

Hi Bob,

Thanks for your message. With respect to research collaborations, it would



be best if you spoke with someone in our Science Branch. Hilary, whom Cathy included on her email below, is away until the beginning of June; however, Angelia Vanderlaan might have availability before then. I have added her to this correspondence. If you have any questions about the Species at Risk Program (e.g. recovery documents, permitting), please let me know. All published right whale recovery documents can be found here:

[http://www.sararegistry.gc.ca/species/speciesDetails\\_e.cfm?sid=780#docs](http://www.sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=780#docs)

Best,  
Katie

**Katherine Hastings**

Species at Risk  
Management Division  
Fisheries and Oceans  
Canada / Government  
of Canada  
[katherine.hastings@dfo-mpo.gc.ca](mailto:katherine.hastings@dfo-mpo.gc.ca) / Tel: 902-401-0070 / Fax: 902-426-2331

Division de la gestion  
des espèces en péril  
Pêches et Océans  
Canada /  
Gouvernement du  
Canada  
[katherine.hastings@dfo-mpo.gc.ca](mailto:katherine.hastings@dfo-mpo.gc.ca) / Tél: 902-401-0070 / Téléc: 902-426-2331

**From:** Robert Hueter  
[\[mailto:rhuetter@mote.org\]](mailto:rhuetter@mote.org)  
**Sent:** May-17-18 9:30 AM  
**To:** Merriman, Catherine B  
**Cc:** [chris@oceanarch.org](mailto:chris@oceanarch.org); Hastings, Katherine; Moors-Murphy, Hilary; Gromack, Aimee; [ameite@oceanarch.org](mailto:ameite@oceanarch.org)  
**Subject:** Re: OCEARCH questions - right whale research connections, permits, in Canada

Thanks so much, Cathy.  
Excited about the opportunities to help you with right whale research this autumn! Obviously there's a dynamic interaction between right whales and white sharks. We're happy to help in any way possible.

Katie, can we discuss marine mammal needs for our shark research ASAP? Please let us know of your availability for a phone call, which we can arrange.

Bob Hueter



On May 16, 2018, at 12:21 PM, Merriman,

Catherine B  
<[Catherine.Merriman@dfo-mpo.gc.ca](mailto:Catherine.Merriman@dfo-mpo.gc.ca)>  
wrote:

Hi Dr.  
Hueter,

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## Docherty, Verna

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**From:** MacDonald, Carl  
**Sent:** June-22-18 3:21 PM  
**To:** Farr, Connie  
**Cc:** Docherty, Verna  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Hi Connie,

Small alteration to the wording of a condition I provided.

Please Change this condition

- Marine mammal parts may not be offered to sharks for feeding or consumption, may not be ingested by sharks, and pieces of marine mammal tissue may not be thrown overboard to attract sharks.

To

- Marine mammal parts may not be offered to sharks for feeding or consumption and may not be ingested by sharks.

Basically removing the latter part of that earlier condition. It's difficult to enforce word thrown.

Regards,

Carl MacDonald  
Resource Management  
Fisheries & Oceans Canada | Government of Canada  
[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca) | Tel: 902-293-8257 | Fax: 902-426-7967

Regional agent principal de gestion des pêches, Gestion des ressources  
Pêches et Océans Canada | Gouvernement du Canada  
[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca) | Tél: 902-293-8257 | Télécopieur: 902-426-7967

---

**From:** Farr, Connie  
**Sent:** 2018-June-19 1:47 PM  
**To:** MacDonald, Carl  
**Cc:** Docherty, Verna  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

It has not been finalized. It looks like she is waiting for comments from NL and a map from NCR. I can add your conditions to the licence though.

Connie

---

**From:** MacDonald, Carl  
**Sent:** June-19-18 1:06 PM  
**To:** Licence Maritimes / Permis Maritimes (DFO/MPO); Farr, Connie  
**Cc:** Docherty, Verna  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Hi Connie,

Just looking for an update on this OCEARCH request for a licence.  
Is it finalized, or awaiting approval? Charlene was working on this.

Conditions to add to licence.

- The licence holder is authorized to conduct research on the following shark species: White shark, Blue Shark, Porbeagle Shark, Common Thresher Shark, and Shortfin Mako Shark.
- Marine mammal parts may not be offered to sharks for feeding or consumption, may not be ingested by sharks, and pieces of marine mammal tissue may not be thrown overboard to attract sharks.
- Efforts to lure, capture, or tag sharks is not authorized to occur in close proximity (within two nautical miles) of endangered whale species, including North Atlantic Right Whales (*Eubalaena glacialis*).

Regards,

Carl MacDonald  
Resource Management  
Fisheries & Oceans Canada | Government of Canada  
[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca) | Tel: 902-293-8257 | Fax: 902-426-7967

Regional agent principal de gestion des peches, Gestion des ressources  
Pêches et Océans Canada | Gouvernement du Canada  
[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca) | Tél: 902-293-8257 | Télécopieur: 902-426-7967

---

**From:** Licence Maritimes / Permis Maritimes (DFO/MPO)  
**Sent:** 2018-June-04 4:20 PM  
**To:** Docherty, Verna; MacDonald, Carl  
**Subject:** FW: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Good afternoon – received this response to our request for additional information (Map for Cruse Track, Bait to be used and list of Shark Species)

I have the Foreign Vessel Application ready to go to the RD for signature (approval) and then to the RDG.

Please advise if you require any changes to this document.

Charlene Cleveland  
Licensing Officer  
Martimes Region – Dartmouth  
Phone: 902-426-1929  
[Charlene.cleveland@dfo-mpo.gc.ca](mailto:Charlene.cleveland@dfo-mpo.gc.ca)

**From:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO)  
**Sent:** 2018-June-04 10:18 AM  
**To:** Licence Maritimes / Permis Maritimes (DFO/MPO)  
**Cc:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO)  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Good morning,

I've received the following in response to the below mentioned requests:

I have answered your questions below **in bold print** and have attached six relevant documents that should assist with providing more information for our request. These attached docs are:

1. Our full permit application to Canada DFO for a Species At Risk Act (SARA) permit.
2. Additional information that was provided to DFO for the SARA permit.
3. A table comparing two capture methods for large sharks and the scientific productivity of each.
4. Our granted SARA permit from DFO for the Maritimes Region.
5. Our granted SARA permit from DFO for Newfoundland.
6. Our authorization letter from NOAA for the use of marine mammal material in our related shark research in U.S. waters.

I refer to some of these documents in the answers to your questions below. Please refer to these docs for further information and I would be happy to clarify any points or provide additional information as needed. If a phone call will help, my direct office line is below and my cell number is [REDACTED] Thanks so much for your assistance, it is much appreciated.

Best regards,

Dr. Bob Hueter

Additionally to the request that the proponents **provide a map of the proposed cruise track for inclusion in the application**, I have received a request for more information regarding the U.S. MSR for the OCEARCH (F2017-120):

**There is no "cruise track" per se for this expedition as we are not following a line transect but instead are sampling in certain key areas in Canadian waters. Please see attached doc #1 which contains a map of the SARA-permitted areas to sample on page 42 of the pdf. We will begin our work in the Mahone Bay region, where we know from our own satellite tracking data that large white sharks have traveled. We will move our operation as necessary to obtain the sample size of sharks we seek, as per the map shown in doc #1. If we are successful in Mahone Bay, we will not need to move to the other areas.**

- Would it be possible for the researcher to describe the bait type they propose to use? le Will the researcher be using Marine Mammal parts for Bait? If so, where will this Marine Mammal bait be acquired?

**In U.S. waters we use marine mammal material obtained from dead, stranded baleen whales, provided to us by the Marine Mammal Response Network here under NOAA authorization shown in attached doc #6. The methods we use are described in attached docs #1, 2 and 6. We use marine mammal material as chum and bait to attract the white sharks in the area to our fishing boat, but do not allow the sharks to ingest the marine mammal bait. We cannot use marine mammal material obtained in U.S. waters in**

Canadian waters, so we are in the process of obtaining a similar authorization to obtain, possess and use marine mammal material in Canadian waters from DFO's Fisheries Management Branch. We sometimes use non-marine mammal material, such as small tuna species, to attract the sharks, but this is far less effective than blubber and other material from baleen whales, on which the white sharks naturally feed.

- Would it be possible for the researcher to be more specific regarding the shark species intended for this research? Currently the document only indicates Shark Species - including White Shark.

This expedition is targeting white sharks (*Carcharodon carcharias*). It is possible we will encounter other shark species in Canadian waters and we could sample and tag those species for Canadian collaborators if desired. Those species could include blue, porbeagle, thresher, or shortfin mako sharks. Any of these and other species could be sampled, tagged and released alive. However, if there are any permitting concerns for these other shark species, we can avoid any interactions with them and focus solely on the white shark.

- It is important to note that Canadian shark researcher (Heather Bowlby) has been approved to conduct research on the same species (White Shark) in the same area (Mahone Bay).

We have previously reached out to Dr. Bowlby and had productive email exchanges with her about collaboration, but that was well before we had obtained our SARA permit, and she did not commit to collaborate until we were authorized for our research in Canada. Now that we have our SARA permits, we will re-connect with her and offer to collaborate in any way she would like. Our goal is to engage with as many Canadian researchers as possible in this expedition. That is the OCEARCH model, to enable local capacity to conduct innovative studies of these large sharks through open collaboration of teams of researchers and students. We believe that Dr. Bowlby does not have access to a research ship similar to the M/V OCEARCH for her white shark research, and therefore we hope she accepts our offer of free shiptime to work collaboratively with us, as we are all working to solve similar questions in white shark biology and conservation.

Please let me know if any further clarification is needed.

Best,

Andrew

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**From:** Licence Maritimes / Permis Maritimes (DFO/MPO)  
**Sent:** May-30-18 12:36 PM  
**To:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO)  
**Subject:** FW: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)  
**Importance:** High

Good afternoon – as we are still working on revisiting this Foreign Vessel application for the above US vessel - Ocearch, and as per the e-mail below from Carl MacDonald, Senior Resource Manager, please have the applicant provide a complete list of Shark species that they will conducting research on. (highlighted in yellow)

The approval process will not move forward until this information is received and well as the previous requests for additional information is received (map of research area and the bait description)

Regards,

Charlene Cleveland  
Regional Officer, Licensing Services  
Dept of Fisheries & Oceans  
Dartmouth, Nova Scotia  
Tel: (902) 426-9966  
Fax: (902) 426-5010  
[Licence.maritimes.permis@dfo-mpo.gc.ca](mailto:Licence.maritimes.permis@dfo-mpo.gc.ca)

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**From:** MacDonald, Carl  
**Sent:** 2018-May-28 9:58 AM  
**To:** Daley, Annette; Berthier, Jacinta  
**Cc:** Docherty, Verna; Licence Maritimes / Permis Maritimes (DFO/MPO)  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)


Hi Annette and Jacinta,

For your consideration

**DFO Requests the proponent to specify the shark species intended for this research. Currently the proponent only indicates Shark Species - including White Shark. Proponent is to list all species (sharks) they are conducting research on. When we know all the species – a condition can be added to specify these are the only shark species authorized to conduct research on.**

Conditions

- Marine mammal parts may not be offered to sharks for feeding or consumption, will not be ingested by sharks, and pieces of marine mammal tissue will not be thrown overboard to attract sharks.
- Efforts to lure, capture, or tag sharks will not occur in close proximity (within two nautical miles) of endangered whale species, including North Atlantic Right Whales (*Eubalaena glacialis*).
- This licence does not authorize research in the area of Mahone Bay, Nova Scotia.

- 
- The licence holder may be required to have an observer (at-sea) on board the vessel during any trip. When required to take an at-sea observer, the licence holder shall not depart from port until the at-sea observer is on board.

Regards,

Carl MacDonald  
Resource Management  
Fisheries & Oceans Canada | Government of Canada  
[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca) | Tel: 902-293-8257 | Fax: 902-426-7967

Regional agent principal de gestion des peches, Gestion des ressources  
Pêches et Océans Canada | Gouvernement du Canada  
[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca) | Tél: 902-293-8257 | Télécopieur: 902-426-7967



**From:** Daley, Annette  
**Sent:** 2018-May-28 8:54 AM  
**To:** Licence Maritimes / Permis Maritimes (DFO/MPO)  
**Cc:** Berthier, Jacinta; Docherty, Verna; MacDonald, Carl  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Charlene, when RM completes the boxes in the form and add any conditions as Science has, the completed form should be sent around for sign off by RDs, before going to the RDG. Thx

*Annette*

**From:** Vézina, Alain  
**Sent:** Monday, May 28, 2018 7:08 AM  
**To:** Daley, Annette <Annette.Daley@dfo-mpo.gc.ca>  
**Cc:** Berthier, Jacinta <Jacinta.Berthier@dfo-mpo.gc.ca>; Docherty, Verna <Verna.Docherty@dfo-mpo.gc.ca>; MacDonald, Carl <Carl.MacDonald@dfo-mpo.gc.ca>; Licence Maritimes / Permis Maritimes (DFO/MPO) <RegionalLicensing.XMAR@dfo-mpo.gc.ca>; Herbert, Glen <Glen.Herbert@dfo-mpo.gc.ca>; Pye, Brad <Brad.Pye@dfo-mpo.gc.ca>; King, Rhea L <Rhea.King@dfo-mpo.gc.ca>; Lambert, Robert <Robert.Lambert@dfo-mpo.gc.ca>  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Thanks Annette,

From Science's perspective, conditions that flow from my concerns are those that are generally applied by coastal states under the UNCLOS MSR guidelines, i.e.

A preliminary report is submitted to <appropriate office in GAC> no later than x months after the end date of the authorized mission.

A copy of all the data collected during the marine scientific research activities is provided to us.

A copy of the final report produced that incorporates information obtained from the marine scientific research is provided to us no later than x years after the end of the mission.

These are the conditions that are imposed on us when we ask for permission to operate in US waters. I have no idea what GAC requires already in their consent letter and if these conditions are included. If they are, fine. If not, this is the minimum we need to do to ensure that we do our due diligence.

**IMPORTANT:** [REDACTED] RM also has some serious questions about use of bait, coordination with Canadian research, etc .... that should be turned into conditions. Also how will we ensure that the observer condition on the SARA permit is met? [REDACTED]

Alain

**From:** Daley, Annette  
**Sent:** May 25, 2018 4:33 PM  
**To:** Vézina, Alain <Alain.Vezina@dfo-mpo.gc.ca>  
**Cc:** Berthier, Jacinta <Jacinta.Berthier@dfo-mpo.gc.ca>; Docherty, Verna <Verna.Docherty@dfo-mpo.gc.ca>;

MacDonald, Carl <Carl.MacDonald@dfo-mpo.gc.ca>; Licence Maritimes / Permis Maritimes (DFO/MPO) <RegionalLicensing.XMAR@dfo-mpo.gc.ca>; Herbert, Glen <Glen.Herbert@dfo-mpo.gc.ca>; Pye, Brad <Brad.Pye@dfo-mpo.gc.ca>; King, Rhea L <Rhea.King@dfo-mpo.gc.ca>; Lambert, Robert <Robert.Lambert@dfo-mpo.gc.ca>  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Alain and Rhea - The recommendation has not gone back to Global Affairs so Ocearch has not been informed. Therefore we will go back around with the review process and perhaps Alain, there is a section in the form to add conditions that would be required to be met under the RDGs signature if we wanted to go that route rather than denying the application. Apparently NL is authorizing some work in Placentia Bay.

*Annette*

**From:** Vézina, Alain  
**Sent:** Wednesday, May 23, 2018 1:37 PM  
**To:** MacDonald, Carl <Carl.MacDonald@dfo-mpo.gc.ca>; Licence Maritimes / Permis Maritimes (DFO/MPO) <RegionalLicensing.XMAR@dfo-mpo.gc.ca>; Herbert, Glen <Glen.Herbert@dfo-mpo.gc.ca>; Pye, Brad <Brad.Pye@dfo-mpo.gc.ca>  
**Cc:** Daley, Annette <Annette.Daley@dfo-mpo.gc.ca>; Berthier, Jacinta <Jacinta.Berthier@dfo-mpo.gc.ca>  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

With respect to the questions on the science section of the approval form:

This research activity will **not** contribute to the Canadian scientific community. Canadian collaborators do not see the benefit of working with Ocearch, even though they have contacted all major Atlantic Universities (Dal, Memorial, Acadia etc), DFO (Heather Bowlby, Mark Simpson), non-profits (Grand Manan Seabird and Whale Research), OTN over the last 2 years. As pointed out by Carl, Heather holds a SARA permit and has an equivalent tagging program for white shark (aka duplication of research effort on a single population of an endangered species). The area that Heather works out of is the outside of St. Margret's Bay or immediately adjacent to Mahone Bay. The main tag type they use is optimized for instantaneous geolocation (excellent opportunities for twitter) but gives no information on habitat use – as needed for SARA research questions.

Canadian scientists will **not** have access to the research data. [REDACTED]

Based on this information, I cannot recommend approval at this time. The amended approval form is attached.

Although I did not change the response in the form, I have no record of a previous approval for this organization.

Outside of my purview, but I understand that the SARA permit requires a DFO observer during at least part of their trip. How will that condition be fulfilled?

Alain

**From:** MacDonald, Carl  
**Sent:** May 23, 2018 10:32 AM  
**To:** Licence Maritimes / Permis Maritimes (DFO/MPO) <RegionalLicensing.XMAR@dfo-mpo.gc.ca>; Vézina, Alain <Alain.Vezina@dfo-mpo.gc.ca>; Herbert, Glen <Glen.Herbert@dfo-mpo.gc.ca>; Pye, Brad <Brad.Pye@dfo-mpo.gc.ca>

Cc: Daley, Annette <Annette.Daley@dfo-mpo.gc.ca>; Berthier, Jacinta <Jacinta.Berthier@dfo-mpo.gc.ca>  
Subject: RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Questions/Comments Regarding Proposed Research:

- Would it be possible for the researcher to describe the bait type they propose to use? ie Will the researcher be using Marine Mammal parts for Bait? If so, where will this Marine Mammal bait be acquired?
- Would it be possible for the researcher to be more specific regarding the shark species intended for this research? Currently the document only indicates Shark Species - including White Shark.
- It is important to note that Canadian shark researcher (Heather Bowlby) has been approved to conducted research on the same species (White Shark) in the same area (Mahone Bay).

Regards,

Carl MacDonald  
Resource Management  
Fisheries & Oceans Canada | Government of Canada  
Carl.MacDonald@dfo-mpo.gc.ca | Tel: 902-293-8257 | Fax: 902-426-7967

Regional agent principal de gestion des peches, Gestion des ressources  
Pêches et Océans Canada | Gouvernement du Canada  
Carl.MacDonald@dfo-mpo.gc.ca | Tél: 902-293-8257 | Télécopieur: 902-426-7967

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**From:** MacDonald, Carl  
**Sent:** 2018-May-22 4:06 PM  
**To:** Licence Maritimes / Permis Maritimes (DFO/MPO); Vézina, Alain; Herbert, Glen; Pye, Brad  
**Cc:** Daley, Annette  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Large Pelagic Comments:

1. *Large pelagic sector.* Pelagic longline fishing takes place along the edge of the Scotian Shelf where the large pelagic fleet conducts operations. Caution must be taken to ensure that the scientific research vessel does not cross previously deployed pelagic longlines which run near the surface for distances of 30 - 40 nm. Damaged gear and identifying marks are to be reported to DFO ([Brad.Pye@dfo-mpo.gc.ca](mailto:Brad.Pye@dfo-mpo.gc.ca)) immediately. Vessel is to continuously broadcast an AIS signal.
  - Swordfish longline gear may be in other areas.
  - Pelagic Longline Gear have AIS beacons attached.
  - Beacons from a licence holder have the same vessel prefix on each beacon ( [REDACTED] )
  - There will be a string of beacons on a line. It is not possible to travel between the beacons with the research vessel.
  - It is possible to travel a suitable distance alongside a pelagic longline set.

Regards,

Carl MacDonald  
Resource Management  
Fisheries & Oceans Canada | Government of Canada  
[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca) | Tel: 902-293-8257 | Fax: 902-426-7967

Regional agent principal de gestion des peches, Gestion des ressources  
Pêches et Océans Canada | Gouvernement du Canada  
[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca) | Tél: 902-293-8257 | Télécopieur: 902-426-7967

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**From:** Licence Maritimes / Permis Maritimes (DFO/MPO)  
**Sent:** 2018-May-18 10:24 AM  
**To:** Vézina, Alain; Herbert, Glen; Pye, Brad; MacDonald, Carl  
**Cc:** Daley, Annette  
**Subject:** FW: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)  
**Importance:** High

Good morning – the response time has been changed to **June 1<sup>st</sup>** instead of the original August 1<sup>st</sup> request.

Please review and provide comments/approval for the attached Foreign Vessel Cruise for Scientific Research (Shark species including White Shark).

I have asked NCR to have the applicant provide us with a Map of the Area to be studied, as the areas are only recorded under section 3 of the application. Placentia Bay, Nfld is listed, but as we do not licence vessels for other waters, I will notify Nfld licensing that this application will be reviewed and no doubt, approved for our waters. If Nfld requests that Placentia Bay be included, we will do that.

Thanks and have a nice day!

Charlene Cleveland  
Regional Officer, Licensing Services  
Dept of Fisheries & Oceans  
Dartmouth, Nova Scotia  
Tel: (902) 426-9966  
Fax: (902) 426-5010  
[Licence.maritimes.permis@dfo-mpo.gc.ca](mailto:Licence.maritimes.permis@dfo-mpo.gc.ca)

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**From:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO)  
**Sent:** 2017-November-30 1:14 PM  
**To:** Licence Maritimes / Permis Maritimes (DFO/MPO); Duggan, Charmaine; Kean, Jackie; Bowdring, Tony  
**Cc:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO); Lavigne, Élise; Farr, Connie; Chmiel, Jim;  
[HlxEcareg1@innav.gc.ca](mailto:HlxEcareg1@innav.gc.ca)  
**Subject:** IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Good afternoon,

Please see attached US Marine Scientific Research (MSR) request for the **OCEARCH, Sep 1 – Oct 31, 2018**. It appears as though the proponent intends to conduct work in both Newfoundland and Maritimes Regions (though primarily in Maritimes).

The vessel intends to call on Halifax, NS, between **Sep 9 – Oct 31, 2018**, for provisioning.

We kindly request all responses by **August 1, 2018**.

Best wishes,

Andrew

**MacDonald, Jennifer**

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**From:** Sweet, Marilyn  
**Sent:** June-26-18 12:55 PM  
**To:** MacDonald, Jennifer; Hastings, Katherine  
**Subject:** RE: OCEARCH response

Yes, being coordinated together for the Section 52 from what I understand. Carl would have taken care of that for RM.

Mar

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**From:** MacDonald, Jennifer  
**Sent:** June-26-18 11:04 AM  
**To:** Sweet, Marilyn; Hastings, Katherine  
**Subject:** RE: OCEARCH response

Thanks for drafting this Marilyn! A few suggestions in red below.

On a related note – OCEARCH has also applied to work in Nfld this summer; we coordinated on the SARA permit, but not sure if the s.52 licences are being coordinated so that the conditions will be the same?

Jenn

**Jennifer MacDonald**  
Species at Risk Management Division  
(902) 407-8175

---

**From:** Sweet, Marilyn  
**Sent:** June-26-18 10:17 AM  
**To:** Hastings, Katherine; MacDonald, Jennifer  
**Subject:** OCEARCH response

Hi Katie and Jen,  
Here is what I propose we send to Bob from OCEARCH:

Hi Bob,

Thank you for taking the time to speak with me on Friday. As we discussed, there are no permits required for acquiring or using marine mammals parts for the research you are proposing, so long as they are not species listed under the *Species at Risk Act*. For example, you would be able to acquire blubber from a Minke whale and use it in your research, but the possession of any part of a species listed as threatened or endangered under SARA (such as the North Atlantic Right Whale) is prohibited under the Act. For the collection or possession of a species at risk or parts of such an individual, one must apply for a permit from the Department in advance of any activities.

To move marine mammal parts from one province to another, a Marine Mammal Transportation Licence is required. This can only be issued when you are in possession of marine mammal parts as the licence includes information on the species and parts being transported.

I should note that although there are not licences required for the use of marine mammal parts as detailed above, the Condition of Licence being issued may place some conditions on what can and cannot be used in the research.

[REDACTED]  
[REDACTED]  
[REDACTED] We will  
be able to give a more certain response once the licence has been finalized and we can review the conditions that are

required. If a similar clause is included, to not allow for the use of marine mammal parts to lure White Sharks, then you would not be able to use marine mammal parts at all, regardless of whether they are SARA listed species or not.

I hope this information helps. Once the licence has been issued I will review to see how it impacts your use of marine mammal parts. In the mean time, feel free to contact Jennifer MacDonald with our Species at Risk Branch to discuss applying for a SARA licence.

Thanks,

Mar

Marilyn Sweet

Senior Advisor | Conseillère principale

Fisheries Management | Gestion des pêches Maritimes Region | Région des Maritimes Fisheries and Oceans Canada | Pêches et Océans Canada

1 Challenger Dr | 1 promenade Challenger

PO Box 1006 | C.P. 1006

Dartmouth, NS Canada B2Y 4A2 | Dartmouth, NÉ Canada B2Y 4A2

(902)-221-7269

Marilyn.Sweet@dfo-mpo.gc.ca

**Pages 660 to / à 661  
are duplicates of  
sont des duplicatas des  
pages 665 to / à 666**



- 3 -

SARA Permit No. : DFO-MAR-2017-17

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## Terms and Conditions of Permit

The activity must be carried on in accordance with the following conditions:

### 1. General Conditions

- 1.1. A copy of this permit shall be kept on site at all times in the possession of the Permit Holder or a person acting under the Permit Holder's authority, and shall be made available to an enforcement officer upon request.
- 1.2. All persons undertaking the activity under the authority of the Permit Holder shall do so under the direction and oversight of the Permit Holder and shall be made familiar with the conditions of this permit.
- 1.3. The activity must comply with the conditions identified within this permit. Activities that affect individuals of species at risk, their residences, or their critical habitat, other than those specifically identified within this permit are not authorized under this permit.
- 1.4. No changes to the Permitted activities shall take place without prior consultation with DFO, and written approval from DFO, Species at Risk Management Division. Contact information as follows:

**Species at Risk Management Division**  
**Fisheries and Oceans Canada**  
**P.O. Box 1006**  
**Dartmouth, NS, B2Y 4A2**  
**email:** [SpeciesatRisk.xmar@dfo-mpo.gc.ca](mailto:SpeciesatRisk.xmar@dfo-mpo.gc.ca)  
**phone:** 1-866-891-0771 **fax:** 1-902-426-2331

### 2. Conditions to avoid or minimize the impact of the activity on the species:

- 2.1. [Activity] shall be undertaken by or under the direct supervision of an individual who is qualified to [enter qualifications- where special qualifications are necessary].
- 2.2. To the extent possible, activities shall be conducted in a manner whereby any individuals of the species shall be handled only in the circumstances authorized under this permit and with the least amount of harm.
- 2.3. The following measures shall be implemented to minimize the impact of the activity on the species:
  - 2.3.1. White Sharks shall not be chased by the vessel.
  - 2.3.2. The following gear shall be used: circle hooks (either 20/0 or 27/0 with zero offset) rigged with a cross bar bit-blocker (30cm up the leader) and attached to a stainless steel wire rope (3/32" or 1/8"). The leader shall be 10m in length and shall be attached to a braid rope with elasticity properties. Leaders shall be embedded inside a three-strand rope to increase the diameter.
  - 2.3.3. Individual White Sharks shall not be kept on the research platform for longer than 20 minutes.
  - 2.3.4. While on the research platform, oxygenated seawater shall be pumped through a hose and mouthpiece into the shark's buccal cavity at all times.
  - 2.3.5. While on the research platform, a tail rope shall be used to prevent the animal from causing harm to itself and others.
  - 2.3.6. While on the research platform, the head and eyes shall be covered with wet terrycloth towel to reduce animal stress and keep eyes moist.
  - 2.3.7. While on the research platform, the skin shall be kept wet.
  - 2.3.8. While on the research platform animal stress shall be monitored by observing skin colouration, presence of blood pooling, gill movements, and animal activity. If stress is visually detected in the animal, a blood sample shall be taken to evaluate the shark's conditions. If acute stress is observed, the animal shall be released immediately.

**Commented [DF07]:** These are from the template, but don't appear in other MAR region permits

**Commented [DF08]:** Note 2.3.1 to 2.3.8 are all related to the mitigations identified by OCEARCH themselves

- 2.3.9. The total time of engagement with a single White Shark from the time it is initially hooked until it is released shall be limited to ## minutes.
- 2.3.10. No more than ## White Sharks, in total, shall be tagged.

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.../4

s.21(1)(b)

- 4 -

SARA Permit No. : DFO-MAR-2017-17

- 2.3.11. Only White Sharks between [REDACTED] in total length shall be caught and tagged.
- 2.3.12. A DFO : [REDACTED] shall be onboard as an observer throughout [REDACTED]
- 2.3.13. In the event of a mortality or significant injury being sustained by a White Shark during a tagging attempt, all further attempts at tagging shall cease and DFO shall be contacted immediately (insert appropriate contact info). No further attempts at catching or tagging White Sharks shall be resumed until approved by DFO.

Commented [DF09]: Need to check these sizes

[REDACTED] conditions from other WSG permits

- 2.4. Only individuals that are experienced in tagging White Sharks shall be permitted to tag.
- 2.5. Only one tagging attempt shall be made per individual White Shark.

### 3. Conditions that relate to monitoring and reporting:

3.1 [REDACTED]

Commented [DF010]: From template but not in other MAR permits

- 3.2. By January 31<sup>st</sup>, 2019, irrespective of whether the Permitted activities took place, a SARA Section 73 Permit Report shall be completed and returned to the Species at Risk Management Division using the contact information provided in condition 1.4. Without limiting the generality of the foregoing, the report shall contain the following information, to the satisfaction of DFO in its sole discretion:
- 3.2.1. to demonstrate that measures and standards to avoid and mitigate the impacts of the permitted activities on the species were implemented according to the conditions of this permit;
- 3.2.2. an assessment of whether the measures and standards mentioned in condition 3.2.1 were successful at avoiding and mitigating the impacts of the permitted activities on the species;
- 3.2.3. details of any contingency measures that were followed to prevent impacts greater than those authorized by this permit;
- 3.2.4. for any interaction with, or sighting of, a White Shark, report the following: date, time, location, condition of the individual; and identify if tagging was attempted or undertaken on that individual; and
- 3.2.5. provide details of any tagging attempts, including whether tagging was successful, unplanned or unexpected impacts on the shark, reaction of the shark to the tagging, and lessons learned.

Commented [DF011]: Template indicates this is required, but don't see this wording in other MAR permits

Commented [DF012]: In the template this refers to the same clause that the text included in? Not sure that's right, should it be referring to the clause before?

Commented [DF013]: Same comment as above

.../5

- 5 -

SARA Permit No. : DFO-MAR-2017-17

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#### Authorization Limitations and Application Conditions

This permit cannot be transferred or assigned to another party. If the activity authorized under this permit is sold or transferred to another party, or if other circumstances arise that result in another party taking over the activity, the Permit Holder shall advise DFO in advance if the ownership or responsibility for the activity is expected to change.

The failure to comply with any condition of this permit is an offence under section 97 of SARA and might result in charges being laid under SARA.

This permit may be revoked or amended to ensure the survival or recovery of White Shark. Without limiting the generality of the foregoing, DFO may:

- suspend any permitted activities to avoid or mitigate additional adverse direct or indirect effects to White Sharks;
- amend or revoke this permit; and
- direct the Permit Holder to carry out at the Permit Holder's expense any modifications or actions deemed necessary by DFO to avoid or mitigate existing impacts or to avoid further adverse direct and indirect impacts to White Sharks.

This permit is valid only with activities and species listed herein and for no other purposes. It does not authorize the Permit Holder to [kill, capture, take, possess, collect, buy, sell, trade, damage the residence of, destroy the residence of, destroy part of the critical habitat of] *[Retain only those that apply]* an individual of a wildlife species that is listed as extirpated, endangered or threatened, or any part or derivative of such an individual. [This permit does not purport to release the Permit Holder from any obligation to obtain permission from or to comply with the requirements of any other regulatory agencies.]

**Commented [DFO14]:** This sentence is from the national template but not included in other MAR permits

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Date of Issue: Month/Day/Year

Signature of authorizing officer: \_\_\_\_\_

Donald Humphrey  
Manager, Species at Risk Management Division  
Maritimes Region  
Fisheries and Oceans Canada  
1 Challenger Drive, P.O. Box 1006, Dartmouth, NS, B2Y 4A2

Further information about this permit is available from the above authorizing officer ([Donald.Humphrey@dfo-mpo.gc.ca](mailto:Donald.Humphrey@dfo-mpo.gc.ca)).

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**Merriman, Catherine B**

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**From:** Sweet, Marilyn  
**Sent:** June-27-18 3:01 PM  
**To:** Hastings, Katherine; MacDonald, Jennifer  
**Cc:** Waters, Christa; Merriman, Catherine B  
**Subject:** RE: OCEARCH response

Copying in Christa and Cathy for follow up with OCEARCH. [REDACTED]  
Thanks

Mar

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**From:** Hastings, Katherine  
**Sent:** June-26-18 1:02 PM  
**To:** MacDonald, Jennifer; Sweet, Marilyn  
**Subject:** RE: OCEARCH response

Hi Marilyn,

Looks good. I've suggested some additional changes below (the areas I worked on are in yellow). I also reordered a couple of the paragraphs.

[REDACTED] I think we talked about this yesterday, but I forget the details.

Thanks!

Katie

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**From:** MacDonald, Jennifer  
**Sent:** June-26-18 11:04 AM  
**To:** Sweet, Marilyn; Hastings, Katherine  
**Subject:** RE: OCEARCH response

Thanks for drafting this Marilyn! A few suggestions in red below.

On a related note – OCEARCH has also applied to work in Nfld this summer; we coordinated on the SARA permit, but not sure if the s.52 licences are being coordinated so that the conditions will be the same?

Jenn

**Jennifer MacDonald**  
Species at Risk Management Division  
(902) 407-8175

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**From:** Sweet, Marilyn  
**Sent:** June-26-18 10:17 AM  
**To:** Hastings, Katherine; MacDonald, Jennifer  
**Subject:** OCEARCH response

Hi Katie and Jen,  
Here is what I propose we send to Bob from OCEARCH:

Hi Bob,

Thank you for taking the time to speak with me on Friday. As we discussed, there are no licences required for acquiring or using marine mammals parts for the research you are proposing, so long as they are not species listed under the *Species at Risk Act*. For example, you would be able to acquire blubber from a Minke whale and use it in your research, but the possession of any part of a species listed as threatened or endangered under SARA (such as the North Atlantic Right Whale) is prohibited under the Act. For the collection or possession of a species at risk or parts of such an individual, one must apply for a permit from the Department in advance of any activities.

Although a licence is not required for the use of marine mammal parts as detailed above, the conditions issued with the section 52 licence may restrict what can and cannot be used in the research. We will be able to give a more certain response on the use of marine mammal parts once the section 52 licence has been finalized.

To move marine mammal parts from one province to another, a Marine Mammal Transportation Licence is required. This can only be issued when you are in possession of marine mammal parts as the licence includes information on the species and parts being transported.

I hope this information helps. Once the section 52 licence has been issued I will review to see how it impacts your use of marine mammal parts. In the meantime, feel free to contact Jennifer MacDonald with our Species at Risk Management Division to discuss applying for a SARA permit.

Thanks,  
Mar

Marilyn Sweet  
Senior Advisor | Conseillère principale  
Fisheries Management | Gestion des pêches Maritimes Region | Région des Maritimes Fisheries and Oceans Canada |  
Pêches et Océans Canada  
1 Challenger Dr | 1 promenade Challenger  
PO Box 1006 | C.P. 1006  
Dartmouth, NS Canada B2Y 4A2 | Dartmouth, NÉ Canada B2Y 4A2  
(902)-221-7269  
[Marilyn.Sweet@dfo-mpo.gc.ca](mailto:Marilyn.Sweet@dfo-mpo.gc.ca)

## MacDonald, Jennifer

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**From:** Hastings, Katherine  
**Sent:** June-28-18 8:47 AM  
**To:** Merriman, Catherine B; Waters, Christa  
**Cc:** MacDonald, Jennifer  
**Subject:** FW: OCEARCH questions - right whale research connections, permits, in Canada  
**Attachments:** RE: OCEARCH response

For your response. See attached for context.

Thanks,  
Katie

---

**From:** Robert Hueter [mailto:[rhueter@mote.org](mailto:rhueter@mote.org)]  
**Sent:** June-27-18 4:42 PM  
**To:** Sweet, Marilyn; Hastings, Katherine  
**Cc:** Chris Fischer; [ameite@oceanarch.org](mailto:ameite@oceanarch.org); Bryan Franks  
**Subject:** Re: OCEARCH questions - right whale research connections, permits, in Canada

Hi Marilyn, great to talk with you last week, just circling back wondering how your discussions went with your colleagues about our authorization request. If everything is a "go" from the marine mammal perspective, we'd like to proceed with obtaining archived, frozen material there in Nova Scotia. Please let us know as soon as possible about where things stand.

Cheers,  
Bob

**ROBERT E. HUETER, Ph.D.**

*Senior Scientist & Director, Center for Shark Research  
Perry W. Gilbert Chair in Shark Research  
Manager, Sharks & Rays Conservation Research Program  
Mote Marine Laboratory  
1600 Ken Thompson Parkway  
Sarasota, FL 34236 USA*

[rhueter@mote.org](mailto:rhueter@mote.org)  
Tel: 941-388-1827  
Fax: 941-388-4312  
More info at: [www.mote.org](http://www.mote.org)

On 6/7/2018 7:05 AM, Sweet, Marilyn wrote:

Hi Bob,  
Sorry, things are very busy on the marine mammal file as you can imagine.

Can you please send me more of a description of the project you are working on. Where would you be getting the marine mammal parts? Is it opportunistic? Are you bringing some from the US to Canada? Are you transporting across provincial borders? What species are you looking at using? If I had more of a project description I would be able to provide better direction on what permits may be required.  
Thank you,

Mar

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**From:** Robert Hueter [<mailto:rhoeter@mote.org>]  
**Sent:** June-07-18 7:54 AM  
**To:** Sweet, Marilyn; Hastings, Katherine  
**Cc:** Chris Fischer; [ameite@oceanarch.org](mailto:ameite@oceanarch.org)  
**Subject:** Re: OCEARCH questions - right whale research connections, permits, in Canada

Thanks Katie. Marilyn I'm happy to schedule a phone call with you today to discuss our request. Chris is on expedition now and out of range. But we know that time is of the essence, as these processes take time and our Canada research trip is only about three months away.

Bob Hueter

On Jun 7, 2018, at 6:42 AM, Hastings, Katherine <[Katherine.Hastings@dfo-mpo.gc.ca](mailto:Katherine.Hastings@dfo-mpo.gc.ca)> wrote:

Hi Bob,

Marilyn Sweet (cc'd) was in touch with you and Chris on May 25<sup>th</sup> to acknowledge receipt of your request. She is juggling a lot of priorities right now, and may not have had a chance yet to address your inquiry, but she is aware, and I am sure will do what she can to address it as soon as possible.

Best,  
Katie

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**From:** Robert Hueter [<mailto:rhoeter@mote.org>]  
**Sent:** June-06-18 5:34 PM  
**To:** Hastings, Katherine  
**Subject:** Re: OCEARCH questions - right whale research connections, permits, in Canada

Katie, we have still not heard from the advisor you mention in your past emails. It's been more than a week since the Tuesday you last said we would be called by.

Can you please help us connect with this person ASAP? Thank you for your help!

Bob

**ROBERT E. HUETER, Ph.D.**  
*Senior Scientist & Director, Center for Shark Research*  
*Perry W. Gilbert Chair in Shark Research*  
*Manager, Sharks & Rays Conservation Research Program*  
*Mote Marine Laboratory*  
*1600 Ken Thompson Parkway*  
*Sarasota, FL 34236 USA*  
  
[rhoeter@mote.org](mailto:rhoeter@mote.org)  
Tel: 941-388-1827  
Fax: 941-388-4312

More info at: [www.mote.org](http://www.mote.org)

On 5/25/2018 11:50 AM, Hastings, Katherine wrote:

Hi Bob,

I have followed up with the advisor responsible. I hope and trust you will have a response by Tuesday if not before.

Thanks,  
Katie

---

**From:** Robert Hueter [<mailto:rhoeter@mote.org>]  
**Sent:** May-25-18 12:30 PM  
**To:** Hastings, Katherine  
**Cc:** Merriman, Catherine B; [chris@oceanarch.org](mailto:chris@oceanarch.org); Moors-Murphy, Hilary; Gromack, Aimee; [ameite@oceanarch.org](mailto:ameite@oceanarch.org); Vanderlaan, Angelia S.; MacDonald, Jennifer  
**Subject:** Re: OCEARCH questions - right whale research connections, permits, in Canada

Dear Katie:

I did not hear anything back on this this week. [REDACTED]  
[REDACTED] this Monday is a national holiday, so I'd appreciate it if you could see if we could get a response next Tuesday-Wednesday.

Thank you -

Bob

**ROBERT E. HUETER, Ph.D.**

*Senior Scientist & Director, Center for Shark Research  
Perry W. Gilbert Chair in Shark Research  
Manager, Sharks & Rays Conservation Research Program  
Mote Marine Laboratory  
1600 Ken Thompson Parkway  
Sarasota, FL 34236 USA*

[rhoeter@mote.org](mailto:rhoeter@mote.org)  
Tel: 941-388-1827  
Fax: 941-388-4312  
More info at: [www.mote.org](http://www.mote.org)

On 5/17/2018 12:34 PM, Hastings, Katherine wrote:

Hi Bob,

The urgency of your request has been conveyed to the appropriate advisors. If you have not heard anything



further by next week (note that Monday is a holiday in Canada), please let me know and I will follow up on your behalf.

Thanks,  
Katie

---

**From:** Robert Hueter [<mailto:rhuetter@mote.org>]  
**Sent:** May-17-18 11:36 AM  
**To:** Hastings, Katherine  
**Cc:** Merriman, Catherine B; [chris@oceanarch.org](mailto:chris@oceanarch.org); Moors-Murphy, Hilary; Gromack, Aimee; [ameite@oceanarch.org](mailto:ameite@oceanarch.org); Vanderlaan, Angelia S.; MacDonald, Jennifer  
**Subject:** Re: OCEARCH questions - right whale research connections, permits, in Canada

OK Katie, please we need to move on this quickly, as we realize the permitting process can take some time and our expedition is planned for September. Attached is the analogous permit granted to us by NOAA, feel free to provide this up the line to the proper authorities for their information to assist.

Standing by -

Bob

**ROBERT E. HUETER, Ph.D.**

*Senior Scientist & Director, Center for Shark Research  
Perry W. Gilbert Chair in Shark Research  
Manager, Sharks & Rays Conservation Research Program  
Mote Marine Laboratory  
1600 Ken Thompson Parkway  
Sarasota, FL 34236 USA*

[rhuetter@mote.org](mailto:rhuetter@mote.org)  
Tel: 941-388-1827  
Fax: 941-388-4312  
More info at: [www.mote.org](http://www.mote.org)

On 5/17/2018 9:51 AM, Hastings, Katherine wrote:

Hi Bob,

That falls under the mandate of our Fisheries Management Branch. I have spoken with them, and they will be in touch soon with more details.

Katie

---

**From:** Robert Hueter  
[mailto:[rhuetter@mote.org](mailto:rhuetter@mote.org)]  
**Sent:** May-17-18 10:27 AM  
**To:** Hastings, Katherine  
**Cc:** Merriman, Catherine B;  
[chris@oceanarch.org](mailto:chris@oceanarch.org); Moors-Murphy,  
Hilary; Gromack, Aimee;  
[ameite@oceanarch.org](mailto:ameite@oceanarch.org); Vanderlaan,  
Angelia S.  
**Subject:** Re: OCEARCH questions -  
right whale research connections,  
permits, in Canada

Thanks Katie, we're looking to connect with those who can assist us with obtaining a marine mammal permit and whale blubber from dead, stranded animals, to attract white sharks for our research, analogous to our NOAA permit and contacts within the NE US Stranding Network. Who is best to discuss that with us? We already have our SARA permit for the white shark research using these methods.

Bob Hueter



On May 17, 2018, at 8:43 AM, Hastings, Katherine <[Katherine.Hastings@dfo-mpo.gc.ca](mailto:Katherine.Hastings@dfo-mpo.gc.ca)> wrote:

Hi Bob,

Thanks for your message. With respect to research collaborations, it would be best if you spoke with someone in our Science Branch. Hilary, whom Cathy included on her email below, is away until the beginning of June;

however, Angelia Vanderlaan might have availability before then. I have added her to this correspondence. If you have any questions about the Species at Risk Program (e.g. recovery documents, permitting), please let me know. All published right whale recovery documents can be found here:

[http://www.sararegistry.gc.ca/species/speciesDetails\\_e.cfm?sid=780#docs](http://www.sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=780#docs)

Best,  
Katie

**Katherine Hastings**

Species at Risk  
Management Division  
Fisheries and Oceans  
Canada / Government  
of Canada  
[katherine.hastings@dfo-mpo.gc.ca](mailto:katherine.hastings@dfo-mpo.gc.ca) / Tel: 902-401-0070 / Fax: 902-426-2331

Division de la gestion  
des espèces en péril  
Pêches et Océans  
Canada /  
Gouvernement du  
Canada  
[katherine.hastings@dfo-mpo.gc.ca](mailto:katherine.hastings@dfo-mpo.gc.ca) / Tél: 902-401-0070 / Téléc: 902-426-2331

---

**From:** Robert Hueter  
[<mailto:rhoeter@mote.org>]

**Sent:** May-17-18 9:30 AM

**To:** Merriman,  
Catherine B

**Cc:** [chris@oceanarch.org](mailto:chris@oceanarch.org);  
Hastings, Katherine;  
Moors-Murphy, Hilary;  
Gromack, Aimee;  
[ameite@oceanarch.org](mailto:ameite@oceanarch.org)

**Subject:** Re:  
OCEARCH questions -  
right whale research  
connections, permits, in  
Canada

Thanks so much, Cathy.  
Excited about the  
opportunities to help  
you with right whale  
research this autumn!  
Obviously there's a  
dynamic interaction  
between right whales  
and white sharks.  
We're happy to help in  
any way possible.

Katie, can we discuss  
marine mammal needs  
for our shark research  
ASAP? Please let us  
know of your  
availability for a phone  
call, which we can  
arrange.

Bob Hueter



On May 16, 2018, at  
12:21 PM, Merriman,  
Catherine B  
<[Catherine.Merriman@dfo-mpo.gc.ca](mailto:Catherine.Merriman@dfo-mpo.gc.ca)>  
wrote:

Hi Dr.  
Hueter,

I got  
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assignment,  
and  
Hilary  
Moors-

Murphy in our Science Branch who leads DFO's whale field research program. If you had called a week earlier, we could have had you join last week's meeting / conference call to coordinate all of the right whale fieldwork activities coming up this year in Atlantic



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Cathy

**Cathy  
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Fisheries  
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**Pages 683 to / à 684  
are duplicates of  
sont des duplicatas des  
pages 665 to / à 666**

**Docherty, Verna**

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**From:** Docherty, Verna  
**Sent:** June-29-18 10:17 AM  
**To:** Waters, Christa  
**Cc:** MacDonald, Carl  
**Subject:** FW: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)  
**Attachments:** IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018); Osearch (Sept 1 to Oct 31, 2018) - FFVLAF - Scientific Research.pdf

The question below was originally directed at Carl [REDACTED]. Attached is the original application, if you can review the highlighted question.

Thanks,  
V

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**From:** Licence Maritimes / Permis Maritimes (DFO/MPO)  
**Sent:** June-29-18 10:11 AM  
**To:** Docherty, Verna  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Sure – see attached.

Charlene

---

**From:** Docherty, Verna  
**Sent:** 2018–June-29 10:05 AM  
**To:** Licence Maritimes / Permis Maritimes (DFO/MPO)  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Hi Charlene,  
Can you send me a copy of the original application?  
V

---

**From:** Licence Maritimes / Permis Maritimes (DFO/MPO)  
**Sent:** June-29-18 9:17 AM  
**To:** Docherty, Verna; MacDonald, Carl  
**Subject:** FW: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Good morning – see question below from Global affairs.

Please advise.

Charlene Cleveland  
Licensing Officer  
Martimes Region – Dartmouth  
Phone: 902-426-1929  
[Charlene.cleveland@dfo-mpo.gc.ca](mailto:Charlene.cleveland@dfo-mpo.gc.ca)

**From:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO)  
**Sent:** 2018-June-28 2:43 PM  
**To:** Licence Maritimes / Permis Maritimes (DFO/MPO)  
**Cc:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO); Farr, Connie  
**Subject:** FW: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Good afternoon,

We received this question below from Global Affairs. Wondering if you have any clarification to offer?

Best,

Andrew

**From:** Marie-Eve.Beland@international.gc.ca [mailto:Marie-Eve.Beland@international.gc.ca]  
**Sent:** June-28-18 1:38 PM  
**To:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO)  
**Cc:** Brammer, Andrew  
**Subject:** FW: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Hi Andrew,

Please advise.

Best regards,

Marie-Eve Béland  
Analyst, Program Policy | Analyste, Politique du programme  
Security and Defence Relations Division (IGR) | Direction des relations de sécurité et de défense (IGR)  
[Marie-Eve.Beland@international.gc.ca](mailto:Marie-Eve.Beland@international.gc.ca)  
Telephone | Téléphone: 343-203-3208  
Blackberry | Blackberry : 613-462-3930  
Facsimile | Télécopieur: 613-992-8011  
Global Affairs Canada | Affaires mondiales Canada  
Government of Canada | Gouvernement du Canada



**From:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO) [mailto:Vessel-Clearance.XNCR@dfo-mpo.gc.ca]  
**Sent:** June-27-18 1:01 PM  
**To:** EXTOTT (IGR)  
**Cc:** Beland, Marie-Eve -IGR; NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO)  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Good afternoon,



DFO has no objections to this MSR request. I have attached a copy of the signed and approved foreign fishing vessel licence approval form for the below mentioned vessel and cruise.

We would request the following:

- That a copy of all data collected during this cruise be sent by email to the following address ([Shar.mar@dfo-mpo.gc.ca](mailto:Shar.mar@dfo-mpo.gc.ca)), and that the proponent include 'IGR-351: US MSR Request OCEARCH (Sep 1 – Oct 31 2018)' in the subject line; and,
- That a copy of the final report incorporating information obtained from the marine scientific research that is the subject of this application be sent no later than (2) years after the end date of the timeframe specified in the consent letter to the following address:

Regional Director, Science  
Maritimes Region  
Fisheries and Oceans Canada  
Bedford Institute of Oceanography  
1 Challenger Drive  
Dartmouth, NS, B2Y 4A2

The licence holder is authorized to conduct research on the following shark species: White Shark, Blue Shark, Porbeagle Shark, Common Thresher Shark, and Shortfin Mako Shark. Marine mammal parts may not be offered to sharks for feeding or consumption, may not be ingested by sharks, and pieces of marine mammal tissue may not be thrown overboard to attract sharks. Efforts to lure, capture, or tag sharks is not authorized to occur in close proximity (defined as within two nautical miles) of endangered whale species, including North Atlantic Right Whales (*Eubalaena glacialis*). A section 73 harm permit is required under the Species at Risk Act, and must be attached to the foreign licence when conducting shark study operations. While operating under this licence, the proponent must abide by the marine mammal interactions and management measures attached to this form.

The licence will be created and issued to the agent, Chris Fischer, prior to the September 1, 2018 start date.

Best,

Andrew

---

**From:** Chris.Conway@international.gc.ca [mailto:Chris.Conway@international.gc.ca] **On Behalf Of** EXTOTT-IGR@international.gc.ca

**Sent:** November-16-17 4:20 PM

**To:** drummond.fraser@tc.gc.ca; FEAR-EERA@cbsa-asfc.gc.ca; Dwyer, Frank J; Sherwood, Heather M; hlxecareg1@innav.gc.ca; IQANORDREG@INNAV.GC.CA; James.Weber@forces.gc.ca; Lehnert, Jean-Pierre; Vollrath, Jennifer; joseph.collins@forces.gc.ca; Kamuran.Sadar@ec.gc.ca; Kenneth.Wong@international.gc.ca; Mark.Grant@forces.gc.ca; melissa.fudge@forces.gc.ca; Michelle.Campbell@international.gc.ca; MSOC-East / COSM-Est (DFO/MPO); sea-mer@ec.gc.ca; Stephen.Locke@NRCan-RNCan.gc.ca; NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO); doug.okeefe@tc.gc.ca; EXTOTT-IGR@international.gc.ca; katerina.klimas@tc.gc.ca; mary-lynn.dickson@canada.ca; Michael.Bielby@forces.gc.ca; Nathan.Blachford@forces.gc.ca; Cory.Olishansky@international.gc.ca; Philip.Bowman@forces.gc.ca; scott.manning@rcmp-grc.gc.ca; Simon.McGowan@forces.gc.ca; Ramona.Sladic@international.gc.ca; Alain.Tellier@international.gc.ca

**Subject:** IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Hi All,

Please see attached US Marine Scientific Research (MSR) request for the **OCEARCH, Sep 1 – Oct 31, 2018.**

The vessel intends to call on Halifax, NS, between **Sep 9 – Oct 31, 2018**, for provisioning.

We kindly request all responses by **August 1, 2018**.

Best Regards,

Chris

Chris Conway, CD

Analyst, Program Policy | Analyste, Politique du programme

Security and Defence Relations Division (IGR) | Direction des relations de sécurité et de défense (IGR)

[Chris.Conway@international.gc.ca](mailto:Chris.Conway@international.gc.ca)

Telephone | Téléphone: 343-203-3208

Blackberry | Blackberry : [REDACTED]

Facsimile | Télécopieur: 613-992-8011

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Affaires mondiales  
Canada

**Pages 689 to / à 701  
are duplicates of  
sont des duplicatas des  
pages 447 to / à 459**

**Pages 702 to / à 707  
are duplicates of  
sont des duplicatas des  
pages 765 to / à 770**

## Cleveland, Charlene

---

**From:** Cleveland, Charlene  
**Sent:** 2018-July-03 2:14 PM  
**To:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO)  
**Cc:** Brammer, Andrew  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)  
**Attachments:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

See attached e-mail from Resource Manager, Carl Macdonald.

Charlene Cleveland  
Regional Officer, Licensing Services  
Dept of Fisheries & Oceans  
Dartmouth, Nova Scotia  
Tel: (902) 426-9966  
Fax: (902) 426-5010  
[Licence.maritimes.permis@dfo-mpo.gc.ca](mailto:Licence.maritimes.permis@dfo-mpo.gc.ca)

---

**From:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO)  
**Sent:** 2018-June-28 2:43 PM  
**To:** Licence Maritimes / Permis Maritimes (DFO/MPO)  
**Cc:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO); Farr, Connie  
**Subject:** FW: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Good afternoon,

We received this question below from Global Affairs. Wondering if you have any clarification to offer?

Best,

Andrew

---

**From:** Marie-Eve.Beland@international.gc.ca [mailto:Marie-Eve.Beland@international.gc.ca]  
**Sent:** June-28-18 1:38 PM  
**To:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO)  
**Cc:** Brammer, Andrew  
**Subject:** FW: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Hi Andrew,



Please advise.

Best regards,

Marie-Eve Béland  
Analyst, Program Policy | Analyste, Politique du programme

Security and Defence Relations Division (IGR) | Direction des relations de sécurité et de défense (IGR)  
[Marie-Eve.Beland@international.gc.ca](mailto:Marie-Eve.Beland@international.gc.ca)  
Telephone | Téléphone: 343-203-3208  
Blackberry | Blackberry : [REDACTED]  
Facsimile | Télécopieur: 613-992-8011  
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Government of Canada | Gouvernement du Canada



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**From:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO) [<mailto:Vessel-Clearance.XNCR@dfo-mpo.gc.ca>]  
**Sent:** June-27-18 1:01 PM  
**To:** EXTOTT (IGR)  
**Cc:** Beland, Marie-Eve -IGR; NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO)  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Good afternoon,

DFO has no objections to this MSR request. I have attached a copy of the signed and approved foreign fishing vessel licence approval form for the below mentioned vessel and cruise.

We would request the following:

- That a copy of all data collected during this cruise be sent by email to the following address ([Shar.mar@dfo-mpo.gc.ca](mailto:Shar.mar@dfo-mpo.gc.ca)), and that the proponent include 'IGR-351: US MSR Request OCEARCH (Sep 1 – Oct 31 2018)' in the subject line; and,
- That a copy of the final report incorporating information obtained from the marine scientific research that is the subject of this application be sent no later than (2) years after the end date of the timeframe specified in the consent letter to the following address:

Regional Director, Science  
Maritimes Region  
Fisheries and Oceans Canada  
Bedford Institute of Oceanography  
1 Challenger Drive  
Dartmouth, NS, B2Y 4A2

The licence holder is authorized to conduct research on the following shark species: White Shark, Blue Shark, Porbeagle Shark, Common Thresher Shark, and Shortfin Mako Shark. Marine mammal parts may not be offered to sharks for feeding or consumption, may not be ingested by sharks, and pieces of marine mammal tissue may not be thrown overboard to attract sharks. Efforts to lure, capture, or tag sharks is not authorized to occur in close proximity (defined as within two nautical miles) of endangered whale species, including North Atlantic Right Whales (*Eubalaena glacialis*). A section 73 harm permit is required under the Species at Risk Act, and must be attached to the foreign licence when conducting shark study operations. While operating under this licence, the proponent must abide by the marine mammal interactions and management measures attached to this form.

The licence will be created and issued to the agent, Chris Fischer, prior to the September 1, 2018 start date.

Best,

Andrew

**From:** Chris.Conway@international.gc.ca [mailto:Chris.Conway@international.gc.ca] **On Behalf Of** EXTOTT-IGR@international.gc.ca

**Sent:** November-16-17 4:20 PM

**To:** drummond.fraser@tc.gc.ca; FEAR-EERA@cbsa-asfc.gc.ca; Dwyer, Frank J; Sherwood, Heather M; hlxecareg1@innav.gc.ca; IQANORDREG@INNAV.GC.CA; James.Weber@forces.gc.ca; Lehnert, Jean-Pierre; Vollrath, Jennifer; joseph.collins@forces.gc.ca; Kamuran.Sadar@ec.gc.ca; Kenneth.Wong@international.gc.ca; Mark.Grant@forces.gc.ca; melissa.fudge@forces.gc.ca; Michelle.Campbell@international.gc.ca; MSOC-East / COSM-Est (DFO/MPO); sea-mer@ec.gc.ca; Stephen.Locke@NRCan-RNCan.gc.ca; NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO); doug.okeefe@tc.gc.ca; EXTOTT-IGR@international.gc.ca; katerina.klimas@tc.gc.ca; mary-lynn.dickson@canada.ca; Michael.Bielby@forces.gc.ca; Nathan.Blachford@forces.gc.ca; Cory.Olishansky@international.gc.ca; Philip.Bowman@forces.gc.ca; scott.manning@rcmp-grc.gc.ca; Simon.McGowan@forces.gc.ca; Ramona.Sladic@international.gc.ca; Alain.Tellier@international.gc.ca  
**Subject:** IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Hi All,

Please see attached US Marine Scientific Research (MSR) request for the **OCEARCH, Sep 1 – Oct 31, 2018.**

The vessel intends to call on Halifax, NS, between **Sep 9 – Oct 31, 2018**, for provisioning.

We kindly request all responses by **August 1, 2018.**

Best Regards,

Chris

Chris Conway, CD  
 Analyst, Program Policy | Analyste, Politique du programme  
 Security and Defence Relations Division (IGR) | Direction des relations de sécurité et de défense (IGR)  
[Chris.Conway@international.gc.ca](mailto:Chris.Conway@international.gc.ca)  
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Affaires mondiales  
Canada

**Cleveland, Charlene**

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**From:** MacDonald, Carl  
**Sent:** 2018-July-03 11:17 AM  
**To:** Licence Maritimes / Permis Maritimes (DFO/MPO); Docherty, Verna  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Hi,

DFO, Resource Management, has approved the use of tending vessels as part of the equipment to be utilized in conducting this research.

Regards,

Carl MacDonald  
Resource Management  
Fisheries & Oceans Canada | Government of Canada  
[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca) | Tel: 902-293-8257 | Fax: 902-426-7967

Regional agent principal de gestion des peches, Gestion des ressources  
Pêches et Océans Canada | Gouvernement du Canada  
[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca) | Tél: 902-293-8257 | Télécopieur: 902-426-7967

---

**From:** Licence Maritimes / Permis Maritimes (DFO/MPO)  
**Sent:** 2018-June-29 9:17 AM  
**To:** Docherty, Verna; MacDonald, Carl  
**Subject:** FW: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Good morning – see question below from Global affairs.

Please advise.

Charlene Cleveland  
Licensing Officer  
Maritimes Region – Dartmouth  
Phone: 902-426-1929  
[Charlene.cleveland@dfo-mpo.gc.ca](mailto:Charlene.cleveland@dfo-mpo.gc.ca)

---

**From:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO)  
**Sent:** 2018-June-28 2:43 PM  
**To:** Licence Maritimes / Permis Maritimes (DFO/MPO)  
**Cc:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO); Farr, Connie  
**Subject:** FW: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)



Good afternoon,

We received this question below from Global Affairs. Wondering if you have any clarification to offer?

Best,

Andrew

---

**From:** Marie-Eve.Beland@international.gc.ca [mailto:Marie-Eve.Beland@international.gc.ca]  
**Sent:** June-28-18 1:38 PM  
**To:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO)  
**Cc:** Brammer, Andrew  
**Subject:** FW: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Hi Andrew,

[REDACTED]

Please advise.

Best regards,

Marie-Eve Béland  
Analyst, Program Policy | Analyste, Politique du programme  
Security and Defence Relations Division (IGR) | Direction des relations de sécurité et de défense (IGR)  
[Marie-Eve.Beland@international.gc.ca](mailto:Marie-Eve.Beland@international.gc.ca)  
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---

**From:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO) [mailto:Vessel-Clearance.XNCR@dfo-mpo.gc.ca]  
**Sent:** June-27-18 1:01 PM  
**To:** EXTOTT (IGR)  
**Cc:** Beland, Marie-Eve -IGR; NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO)  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Good afternoon,

DFO has no objections to this MSR request. I have attached a copy of the signed and approved foreign fishing vessel licence approval form for the below mentioned vessel and cruise.

We would request the following:

- That a copy of all data collected during this cruise be sent by email to the following address ([Shar.mar@dfompo.gc.ca](mailto:Shar.mar@dfompo.gc.ca)), and that the proponent include 'IGR-351: US MSR Request OCEARCH (Sep 1 – Oct 31 2018)' in the subject line; and,
- That a copy of the final report incorporating information obtained from the marine scientific research that is the subject of this application be sent no later than (2) years after the end date of the timeframe specified in the consent letter to the following address:

Regional Director, Science  
Maritimes Region  
Fisheries and Oceans Canada  
Bedford Institute of Oceanography  
1 Challenger Drive  
Dartmouth, NS, B2Y 4A2

The licence holder is authorized to conduct research on the following shark species: White Shark, Blue Shark, Porbeagle Shark, Common Thresher Shark, and Shortfin Mako Shark. Marine mammal parts may not be offered to sharks for feeding or consumption, may not be ingested by sharks, and pieces of marine mammal tissue may not be thrown overboard to attract sharks. Efforts to lure, capture, or tag sharks is not authorized to occur in close proximity (defined as within two nautical miles) of endangered whale species, including North Atlantic Right Whales (*Eubalaena glacialis*). A section 73 harm permit is required under the Species at Risk Act, and must be attached to the foreign licence when conducting shark study operations. While operating under this licence, the proponent must abide by the marine mammal interactions and management measures attached to this form.

The licence will be created and issued to the agent, Chris Fischer, prior to the September 1, 2018 start date.

Best,

Andrew

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**From:** Chris.Conway@international.gc.ca [mailto:Chris.Conway@international.gc.ca] **On Behalf Of** EXTOTT-IGR@international.gc.ca

**Sent:** November-16-17 4:20 PM

**To:** drummond.fraser@tc.gc.ca; FEAR-EERA@cbsa-asfc.gc.ca; Dwyer, Frank J; Sherwood, Heather M; hlxecareg1@innav.gc.ca; IQANORDREG@INNAV.GC.CA; James.Weber@forces.gc.ca; Lehnert, Jean-Pierre; Vollrath, Jennifer; joseph.collins@forces.gc.ca; Kamuran.Sadar@ec.gc.ca; Kenneth.Wong@international.gc.ca; Mark.Grant@forces.gc.ca; melissa.fudge@forces.gc.ca; Michelle.Campbell@international.gc.ca; MSOC-East / COSM-Est (DFO/MPO); sea-mer@ec.gc.ca; Stephen.Locke@NRCan-RNCan.gc.ca; NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO); doug.okeefe@tc.gc.ca; EXTOTT-IGR@international.gc.ca; katerina.klimas@tc.gc.ca; mary-lynn.dickson@canada.ca; Michael.Bielby@forces.gc.ca; Nathan.Blachford@forces.gc.ca; Cory.Olishansky@international.gc.ca; Philip.Bowman@forces.gc.ca; scott.manning@rcmp-grc.gc.ca; Simon.McGowan@forces.gc.ca; Ramona.Sladic@international.gc.ca; Alain.Tellier@international.gc.ca

**Subject:** IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Hi All,

Please see attached US Marine Scientific Research (MSR) request for the **OCEARCH, Sep 1 – Oct 31, 2018.**

The vessel intends to call on Halifax, NS, between **Sep 9 – Oct 31, 2018**, for provisioning.

We kindly request all responses by **August 1, 2018.**

Best Regards,

Chris

Chris Conway, CD

Analyst, Program Policy | Analyste, Politique du programme

Security and Defence Relations Division (IGR) | Direction des relations de sécurité et de défense (IGR)

[Chris.Conway@international.gc.ca](mailto:Chris.Conway@international.gc.ca)

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Affaires mondiales  
Canada

**From:** Reed, Allison D <ReedAD@state.gov>  
**Sent:** July-04-18 11:18 AM  
**To:** Celes Eckerman; Kastrinsky, Matthew R; Marie-Eve.Beland@international.gc.ca; EXTOTT-IGR@international.gc.ca; Marine Science  
**Cc:** Teschendorf, Steven C; Tibbetts, Robert E; rhueter@mote.org; MacDonald, Jennifer  
**Subject:** Re: OCEARCH permitting process - Severe timeline problem

Hello Celes,

We are in close contact with our Canadian counterpart (Marie-Eve Béland, copied), and can assure you they are doing their very best to issue the MSR consent as soon as possible.

The unfortunate part of the MSR review process is that it can often take longer than expected, since so many agencies must be consulted. As far as we understand it, nothing has changed, it is just taking a bit longer than expected when we received the correspondence below on May 11.

Thank you SO much for your patience, we truly appreciate it.

All the best,

Allison

---

**From:** Celes Eckerman  
**Sent:** Wednesday, June 27, 2018 9:25 PM  
**To:** Kastrinsky, Matthew R; Reed, Allison D; Marie-Eve.Beland@international.gc.ca; EXTOTT-IGR@international.gc.ca; Marine Science  
**Cc:** Teschendorf, Steven C; Tibbetts, Robert E; rhueter@mote.org; jennifer.macdonald@dfo-mpo.gc.ca  
**Subject:** Re: OCEARCH permitting process - Severe timeline problem

Matt, as you can see from the series of correspondence below, OCEARCH submitted this application in **November 2017**, to ensure ample time for it to be reviewed and (hopefully) approved in June 2018. As we explained a few months ago (see below), OCEARCH needs to obtain provincial permits in Nova Scotia and Newfoundland, as well as authorization to use marine mammal parts as chum/bait – all hinge on first obtaining the federal boat permits. If those permits aren't granted until 1 September, it will be too late.

We had been getting some good help from our Canadian counterparts a few weeks ago when Allison Reed reached out asking for this application to be expedited. If something has changed, we need to understand what, and how we might fix it.

With gratitude,

*Celes Eckerman*

m. 2022573563



**GALVANIZE PARTNERS**  
*forward together*

**From:** "Kastrinsky, Matthew R" <KastrinskyMR@state.gov>  
**Date:** Wednesday, June 27, 2018 at 1:05 PM  
**To:** Celes Eckerman [REDACTED] "Reed, Allison D" <ReedAD@state.gov>, "Marie-Eve.Beland@international.gc.ca" <Marie-Eve.Beland@international.gc.ca>, "EXTOTT-IGR@international.gc.ca" <EXTOTT-IGR@international.gc.ca>, Marine Science <MarineScience@state.gov>  
**Cc:** "Teschendorf, Steven C" <TeschendorfSC@state.gov>, "Tibbetts, Robert E" <TibbettsRE@state.gov>, [REDACTED] "rhueter@mote.org" <rhueter@mote.org>, "jennifer.macdonald@dfo-mpo.gc.ca" <jennifer.macdonald@dfo-mpo.gc.ca>  
**Subject:** RE: OCEARCH permitting process - Severe timeline problem

Hello Celes,

Our Canadian counterparts are reviewing the application and will relay any additional requests needed for their review. During the busy research/application season, application review can take some time and we do not expect to receive consent until much closer to the cruise start date (Sept. 1 as listed in RATS, I believe). Thank you very much for your patience and understanding.

Regards,  
 Matt

**Matthew Kastrinsky**  
 Program Analyst  
 Office of Ocean and Polar Affairs  
 U.S. Department of State  
[KastrinskyMR@state.gov](mailto:KastrinskyMR@state.gov)  
 Office (202) 485-1540  
 BlackBerry [REDACTED]  
 Contractor, Kenjya-Trusant Group

**Official**  
**UNCLASSIFIED**

**From:** Celes Eckerman [REDACTED]  
**Sent:** Tuesday, June 26, 2018 1:48 PM  
**To:** Reed, Allison D <ReedAD@state.gov>; Marie-Eve.Beland@international.gc.ca; Kastrinsky, Matthew R <KastrinskyMR@state.gov>; EXTOTT-IGR@international.gc.ca; Marine Science <MarineScience@state.gov>  
**Cc:** Teschendorf, Steven C <TeschendorfSC@state.gov>; Tibbetts, Robert E <TibbettsRE@state.gov>; [REDACTED] rhueter@mote.org; jennifer.macdonald@dfo-mpo.gc.ca  
**Subject:** Re: OCEARCH permitting process - Severe timeline problem

Allison and Friends, we are fast approaching our planned research mission and are hoping for some definitive feedback from our Canadian colleagues. Would it be possible to get an update?

Many thanks, Celes

Celes

---

**From:** "Reed, Allison D" <[ReedAD@state.gov](mailto:ReedAD@state.gov)>  
**Date:** Friday, May 11, 2018 at 1:44 PM  
**To:** "[Marie-Eve.Beland@international.gc.ca](mailto:Marie-Eve.Beland@international.gc.ca)" <[Marie-Eve.Beland@international.gc.ca](mailto:Marie-Eve.Beland@international.gc.ca)>, "[KastrinskyMR@state.gov](mailto:KastrinskyMR@state.gov)", "[EXTOTT-IGR@international.gc.ca](mailto:EXTOTT-IGR@international.gc.ca)" <[EXTOTT-IGR@international.gc.ca](mailto:EXTOTT-IGR@international.gc.ca)>, Marine Science <[MarineScience@state.gov](mailto:MarineScience@state.gov)>  
**Cc:** "Teschendorf, Steven C" <[TeschendorfSC@state.gov](mailto:TeschendorfSC@state.gov)>, "Tibbetts, Robert E" <[TibbettsRE@state.gov](mailto:TibbettsRE@state.gov)>, "[rhueter@mote.org](mailto:rhueter@mote.org)" <[rhueter@mote.org](mailto:rhueter@mote.org)>, "[jennifer.macdonald@dfo-mpo.gc.ca](mailto:jennifer.macdonald@dfo-mpo.gc.ca)" <[jennifer.macdonald@dfo-mpo.gc.ca](mailto:jennifer.macdonald@dfo-mpo.gc.ca)>  
**Subject:** RE: OCEARCH permitting process - Severe timeline problem

Thank you Marie-Eve,  
 The vessel will be conducting marine scientific research, not commercial activities. U.S. academic institutions will be collecting the data, and making it publicly available.  
 Best,  
 Allison

**Official**  
**UNCLASSIFIED**

**From:** [Marie-Eve.Beland@international.gc.ca](mailto:Marie-Eve.Beland@international.gc.ca) <[Marie-Eve.Beland@international.gc.ca](mailto:Marie-Eve.Beland@international.gc.ca)>  
**Sent:** Friday, May 11, 2018 3:12 PM  
**To:** Reed, Allison D <[ReedAD@state.gov](mailto:ReedAD@state.gov)>; "[KastrinskyMR@state.gov](mailto:KastrinskyMR@state.gov)" <[KastrinskyMR@state.gov](mailto:KastrinskyMR@state.gov)>; [EXTOTT-IGR@international.gc.ca](mailto:EXTOTT-IGR@international.gc.ca); Marine Science <[MarineScience@state.gov](mailto:MarineScience@state.gov)>  
**Cc:** [Teschendorf, Steven C](mailto:TeschendorfSC@state.gov) <[TeschendorfSC@state.gov](mailto:TeschendorfSC@state.gov)>; [Tibbetts, Robert E](mailto:TibbettsRE@state.gov) <[TibbettsRE@state.gov](mailto:TibbettsRE@state.gov)>; "[rhueter@mote.org](mailto:rhueter@mote.org)"; [jennifer.macdonald@dfo-mpo.gc.ca](mailto:jennifer.macdonald@dfo-mpo.gc.ca)  
**Subject:** RE: OCEARCH permitting process - Severe timeline problem

Good afternoon Allison,

The request seemed to be complete and was submitted to our consultation committee for processing. I have not received any questions to date, and if I do, I will relay them to you immediately. The process has been expedited as requested and we expect to receive responses by early June.

With regards to the question below, could you please clarify if this vessel will be conducting commercial activities in Canadian waters, or will the vessel be conducting state-sponsored Marine Scientific Research in Canadian waters?

I will be communicating with my colleagues to see if additional permits are required.

Best regards,

Marie-Eve Béland  
 Analyst, Program Policy | Analyste, Politique du programme  
 Security and Defence Relations Division (IGR) | Direction des relations de sécurité et de défense (IGR)  
[Marie-Eve.Beland@international.gc.ca](mailto:Marie-Eve.Beland@international.gc.ca)  
 Telephone | Téléphone: 343-203-3208  
 Blackberry | Blackberry :  
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---

**From:** Reed, Allison D [<mailto:ReedAD@state.gov>]  
**Sent:** May-11-18 2:51 PM  
**To:** Celes Eckerman; Kastrinsky, Matthew R; Beland, Marie-Eve -IGR; EXTOTT (IGR); Marine Science  
**Cc:** Teschendorf, Steven C; Tibbetts, Robert E; Brandon Eyre; Robert Hueter; [jennifer.macdonald@dfo-mpo.gc.ca](mailto:jennifer.macdonald@dfo-mpo.gc.ca)  
**Subject:** RE: OCEARCH permitting process - Severe timeline problem

Thank you Celes,

I have pasted the other email you sent us below, since it gives a bit more information. I am not sure where your Canadian friend is receiving their information, but all of our Canadian counterparts are copied on here so can hopefully let us know if there is anything additional you need to do at this time. In my office we do not do anything regarding commercial ships operating in Canada; all we do is process requests for marine scientific research (MSR) consent, which is what we submitted to Canada for your research cruise. I do not think you have to follow a process for operating a commercial ship since the ship will be conducting MSR, but if I am wrong, our Canadian counterparts can correct me.

Marie-Eve,

I believe we have submitted all required information you need for this MSR cruise, via the Research Application Tracking System (RATS). Can you please let us know if there is something additional the OCEARCH scientists need to do, based on the information they have received below regarding commercial ships operating in Canada? Our thanks for your assistance.

Best,  
Allison

FROM CELES:

FMatt, we rec'd the below from a CDN friend who is advising us on the process to operate a commercial vessel in Canadian waters. We've been certified by NOAA as a research vessel (the document I shared last week), but if this is the process we're in, no one has told us that, or asked us to fill out additional paperwork/hire CDN crew, etc. We're running out of time and still don't really have a clear sense of what the problem is. Thank you for whatever you can do to help clarify the situation.

"hi  
 just to advise - this is long drawn out affair  
 to get all the papers in order would need approx. 60 days  
 and expensive - most likely would have to ask around  
 to make sure no CDN Vessel could do this and would need

to place some CDN onboard as crew - especially people like cooks/deck hands (people that could be found in Canada ) some things

1. - need picture of vessel
2. worth of vessel - this is what is used for the CDN Coastal licence )
3. number of crew

Rick - if you need to go further - will try and get contacts but try under Canadian Coastal Trade - understand should be some forms “

**Official**  
**UNCLASSIFIED**

**From:** Celes Eckerman [REDACTED]  
**Sent:** Friday, May 11, 2018 11:41 AM  
**To:** Kastrinsky, Matthew R <KastrinskyMR@state.gov>; Marie-Eve.Beland@international.gc.ca; 'EXTOTT-IGR@international.gc.ca' <EXTOTT-IGR@international.gc.ca>; Marine Science <MarineScience@state.gov>  
**Cc:** Teschendorf, Steven C <TeschendorfSC@state.gov>; Tibbetts, Robert E <TibbettsRE@state.gov>; Brandon Eyre [REDACTED]; Robert Hueter <rhueter@mote.org>; jennifer.macdonald@dfo-mpo.gc.ca  
**Subject:** Re: OCEARCH permitting process - Severe timeline problem

Matthew, clarification regarding OCEARCH ship NOAA status – we are neither a NOAA ship, nor a commercial ship (also, you'll have to share this with our CDN friends, because my emails are all bouncing back).

Some clarifications are in order. It's inaccurate to say that NOAA "has classified [our ship] as a research vessel." The M/V OCEARCH is classified as a private motor vessel, not as a research vessel (R/V). What NOAA has done is given us a Letter of Acknowledgment (LOA) stating their understanding and approval of the research that OCEARCH does in US federal waters on highly migratory species (sharks and other fishes). So our research is approved/acknowledged by NOAA, but our vessel is not a NOAA vessel.

Neither is it a "commercial" vessel. The M/V OCEARCH is not a commercial research or fishing boat. It is a privately owned vessel that conducts scientific research under the flag of an independent NGO, facilitating the work of scientists from many types of institutions, from independent labs to universities to government. It is much more similar to a research vessel operated by a US university than it is to being a commercial vessel. In fact, the ship is now affiliated with Jacksonville University, a private, nonprofit, accredited university in Jacksonville, Florida, the ship's home now. Perhaps that affiliation will help with this logjam?

*Celes*



**From:** "Kastrinsky, Matthew R" <[KastrinskyMR@state.gov](mailto:KastrinskyMR@state.gov)>  
**Date:** Wednesday, May 2, 2018 at 10:52 AM  
**To:** "[Marie-Eve.Beland@international.gc.ca](mailto:Marie-Eve.Beland@international.gc.ca)" <[Marie-Eve.Beland@international.gc.ca](mailto:Marie-Eve.Beland@international.gc.ca)>, "EXTOTT-IGR@international.gc.ca" <[EXTOTT-IGR@international.gc.ca](mailto:EXTOTT-IGR@international.gc.ca)>, Marine Science <[MarineScience@state.gov](mailto:MarineScience@state.gov)>  
**Cc:** Celes Eckerman [REDACTED] "Teschendorf, Steven C" <[TeschendorfSC@state.gov](mailto:TeschendorfSC@state.gov)>, "Tibbetts, Robert E" <[TibbettsRE@state.gov](mailto:TibbettsRE@state.gov)>, Brandon Eyre [REDACTED] Robert Hueter <[rhueter@mote.org](mailto:rhueter@mote.org)>, "[jennifer.macdonald@dfo-mpo.gc.ca](mailto:jennifer.macdonald@dfo-mpo.gc.ca)" <[jennifer.macdonald@dfo-mpo.gc.ca](mailto:jennifer.macdonald@dfo-mpo.gc.ca)>  
**Subject:** FW: OCEARCH permitting process - Severe timeline problem

Hello Marie-Eve,

Celes just emailed me and indicated that she is receiving some email bounce backs from you, so I'm forwarding her recent email with hopes that it successfully reaches you. Please see her note below in addition to the two attachments.

Thanks,  
 Matt

**Matthew Kastrinsky**  
 Program Analyst  
 Office of Ocean and Polar Affairs  
 U.S. Department of State  
[KastrinskyMR@state.gov](mailto:KastrinskyMR@state.gov)  
 Office (202) 485-1540  
 BlackBerry [REDACTED]  
 Contractor, Kenjya-Trusant Group

Official  
 UNCLASSIFIED

**From:** Celes Eckerman [REDACTED]  
**Sent:** Wednesday, May 2, 2018 1:41 PM  
**To:** [Marie-Eve.Beland@international.gc.ca](mailto:Marie-Eve.Beland@international.gc.ca); Kastrinsky, Matthew R <[KastrinskyMR@state.gov](mailto:KastrinskyMR@state.gov)>; Reed, Allison D <[ReedAD@state.gov](mailto:ReedAD@state.gov)>; Teschendorf, Steven C <[TeschendorfSC@state.gov](mailto:TeschendorfSC@state.gov)>; Tibbetts, Robert E <[TibbettsRE@state.gov](mailto:TibbettsRE@state.gov)>; Marine Science <[MarineScience@state.gov](mailto:MarineScience@state.gov)>  
**Cc:** [REDACTED] [rhueter@mote.org](mailto:rhueter@mote.org); [jennifer.macdonald@dfo-mpo.gc.ca](mailto:jennifer.macdonald@dfo-mpo.gc.ca)  
**Subject:** Re: OCEARCH permitting process - Severe timeline problem

Ms. Beland, thank you so much for your response. Attached is our SARA permit from the Gov't of Canada, just received this week, as well as our Letter of Acknowledgement from U.S. NOAA's Highly Migratory Species Division. Hoping these reinforce the legitimacy of the work OCEARCH does and would like to do in Canada.

Any insight you can provide into the process on your end would be deeply appreciated.

*Celes Eckerman*

m. 2022573563



**GALVANIZE PARTNERS**  
*forward together*

---

**From:** <Marie-Eve.Beland@international.gc.ca>

**Date:** Wednesday, May 2, 2018 at 9:49 AM

**To:** <KastrinskyMR@state.gov>, <[REDACTED]>, <ReedAD@state.gov>, <TeschendorfSC@state.gov>, <TibbettsRE@state.gov>, <MarineScience@state.gov>

**Cc:** <[REDACTED]>, <rhueter@mote.org>, <jennifer.macdonald@dfo-mpo.gc.ca>

**Subject:** RE: OCEARCH permitting process - Severe timeline problem

Good afternoon,

The concerns mentioned in the email below have been noted and we will be doing our best to expedite the clearance process.

Best regards,

Marie-Eve Béland

Analyst, Program Policy | Analyste, Politique du programme

Security and Defence Relations Division (IGR) | Direction des relations de sécurité et de défense (IGR)

[Marie-Eve.Beland@international.gc.ca](mailto:Marie-Eve.Beland@international.gc.ca)

Telephone | Téléphone: 343-203-3208

Blackberry | Blackberry : [REDACTED]

Facsimile | Télécopieur: 613-992-8011

Global Affairs Canada | Affaires mondiales Canada

Government of Canada | Gouvernement du Canada



Global Affairs  
Canada

Affaires mondiales  
Canada

---

**From:** Kastrinsky, Matthew R [<mailto:KastrinskyMR@state.gov>]

**Sent:** April-27-18 1:28 PM

**To:** Celes Eckerman; Reed, Allison D; Teschendorf, Steven C; Tibbetts, Robert E; Marine Science

**Cc:** Brandon Eyre; Robert Hueter; Beland, Marie-Eve -IGR; [jennifer.macdonald@dfo-mpo.gc.ca](mailto:jennifer.macdonald@dfo-mpo.gc.ca)

**Subject:** RE: OCEARCH permitting process - Severe timeline problem

Hi Celes,

Apologies for the delay- I've added Marie-Eve Beland, our Canadian counterpart that may be able to provide some information about this situation. I'm sure you can better explain the situation, but I've copied from below a summary of the major issues associated with the OCEARCH permitting process, with hopes that Marie-Eve may be able to communicate with DFO (Jennifer MacDonald, copied) to help work through this issue.

**First**, in order to successfully and responsibly carry out a September expedition, OCEARCH is going to need to have a green light to start planning in June. Waiting until after the comment period closes in August would be a disaster.

**Second**, OCEARCH needs additional permits from the provinces (which they're coordinating with DFO), and those can't be processed until after the federal MSR is approved. Again, waiting until after August in the hope of executing a September mission simply won't work.

Thank you, and please let us at State ([MarineScience@state.gov](mailto:MarineScience@state.gov)) know if there is anything else we can do at the moment.

Regards,  
Matt

**Matthew Kastrinsky**

Program Analyst  
Office of Ocean and Polar Affairs  
U.S. Department of State  
[KastrinskyMR@state.gov](mailto:KastrinskyMR@state.gov)  
Office (202) 485-1540  
BlackBerry [REDACTED]  
Contractor, Kenjya-Trusant Group

**Official**

**UNCLASSIFIED**

**From:** Celes Eckerman [REDACTED]  
**Sent:** Monday, April 23, 2018 7:33 PM  
**To:** Reed, Allison D <[ReedAD@state.gov](mailto:ReedAD@state.gov)>; Teschendorf, Steven C <[TeschendorfSC@state.gov](mailto:TeschendorfSC@state.gov)>; Tibbetts, Robert E <[TibbettsRE@state.gov](mailto:TibbettsRE@state.gov)>; Marine Science <[MarineScience@state.gov](mailto:MarineScience@state.gov)>  
**Cc:** Brandon Eyre <[REDACTED]> Robert Hueter <[rhuetter@mote.org](mailto:rhuetter@mote.org)>  
**Subject:** Re: OCEARCH permitting process - Severe timeline problem

Allison, we would appreciate whatever help you can provide. In addition, we heard today from our contacts at DFO that they expect to issue the SARA permit next week – this is usually the most difficult permit to obtain.

Again, thank you for your help!

*Celes*

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**From:** "Reed, Allison D" <[ReedAD@state.gov](mailto:ReedAD@state.gov)>  
**Date:** Monday, April 23, 2018 at 3:09 PM  
**To:** Celes Eckerman [REDACTED], "Teschendorf, Steven C" <[TeschendorfSC@state.gov](mailto:TeschendorfSC@state.gov)>, "Tibbetts, Robert E" <[TibbettsRE@state.gov](mailto:TibbettsRE@state.gov)>, Marine Science <[MarineScience@state.gov](mailto:MarineScience@state.gov)>

**Cc:** Brandon Eyre [REDACTED]  
**Subject:** RE: OCEARCH permitting process - Severe timeline problem

Hi Celes,

We have not encountered this situation in the time I've been covering these applications. We process the applications to the Canadian officials, and they run it through their internal process; all required permits including ones from DFO come through around the same time the MSR consent is sent to us.

Would you mind if I forward your email thread to our Canadian counterpart, copy everyone on this email, and also copy your DFO points of contact? I think the next step would be to connect the folks we are respectively working with in Canada to figure this out.

All the best,  
Allison

**Official**  
**UNCLASSIFIED**

**From:** Celes Eckerman <[REDACTED]>  
**Sent:** Friday, April 20, 2018 12:03 PM  
**To:** Reed, Allison D <[ReedAD@state.gov](mailto:ReedAD@state.gov)>; Teschendorf, Steven C <[TeschendorfSC@state.gov](mailto:TeschendorfSC@state.gov)>; Tibbetts, Robert E <[TibbettsRE@state.gov](mailto:TibbettsRE@state.gov)>; Marine Science <[MarineScience@state.gov](mailto:MarineScience@state.gov)>  
**Cc:** Brandon Eyre <[REDACTED]>  
**Subject:** OCEARCH permitting process - Severe timeline problem

Allison, further to your kind offer to help connect our Canadian interlocutors to yours, I'm forwarding this email to Jennifer MacDonald and Darrin Sooley with Canada's DFO.

Two issues we need to address in the timeline you received from the folks at the federal level that you're interacting with:

**First**, in order to successfully and responsibly carry out a September expedition, OCEARCH is going to need to have a green light to start planning in June. Waiting until after the comment period closes in August would be a disaster.

**Second**, OCEARCH needs additional permits from the provinces (which they're coordinating with DFO), and those can't be processed until after the federal MSR is approved. Again, waiting until after August in the hope of executing a September mission simply won't work.

We appreciate you connecting DFO with your colleagues at the federal level so we can ensure they understand our timeline isn't September, but June – at the latest.

Deeply grateful for your ongoing support – please let us know if you have any questions.

*Celes*

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**From:** Robert Hueter <[rhueter@mote.org](mailto:rhueter@mote.org)>  
**Organization:** Mote Marine Laboratory  
**Date:** Friday, April 20, 2018 at 8:48 AM

To: "MacDonald, Jennifer" <[Jennifer.MacDonald@dfo-mpo.gc.ca](mailto:Jennifer.MacDonald@dfo-mpo.gc.ca)>, "Sooley, Darrin" <[Darrin.Sooley@dfo-mpo.gc.ca](mailto:Darrin.Sooley@dfo-mpo.gc.ca)>

Cc: Chris Fischer <[chris@oceanarch.org](mailto:chris@oceanarch.org)>, Brandon Eyre <[REDACTED]>

**Subject:** Re: Permitting information

Dear Darrin & Jenn:

Hope you both are doing well. I'm checking in on the status of our SARA permit. Can we expect this to arrive soon?

Also, looking for some help from your office. We have been told our permit application to bring the M/V OCEARCH in to Canadian waters to conduct fisheries research is out for stakeholder comment, and since we don't need the permit until September, we're being told this comment period will be open through August. I'm sure you can appreciate that that doesn't work for us. It's impossible to plan a major expedition and move our ship for this without at least 90 days' notice on permitting. This is also holding up our progress on other permits, such as the individual province permits from Nova Scotia and Newfoundland to work in their waters. Can you help us entangle this situation? Any advice or assistance would be extremely welcome. I'm ccing Brandon Eyre and Celes Eckerman, our two folks dealing with these permit issues.

We appreciate an update on the SARA permit and any and all help you can provide on the rest of the permitting issues. Thanks to you both.

Bob

**ROBERT E. HUETER, Ph.D.**

*Senior Scientist & Director, Center for Shark Research  
Perry W. Gilbert Chair in Shark Research  
Manager, Sharks & Rays Conservation Research Program  
Mote Marine Laboratory  
1600 Ken Thompson Parkway  
Sarasota, FL 34236 USA*

[rhuetter@mote.org](mailto:rhuetter@mote.org)

Tel: 941-388-1827

Fax: 941-388-4312

More info at: [www.mote.org](http://www.mote.org)

On 3/22/2018 2:03 PM, MacDonald, Jennifer wrote:

Hi Bob and Chris,

Thank you for a good conversation this afternoon and the additional information you provided us.

As a follow-up to your question about other permitting or approvals required, you will require a licence under Section 52 of the Fishery (General) Regulations, which are licences issued for educational, experimental, public display or scientific purposes. The latest version of the application form can be obtained by emailing: [RegionalLicensing.XMAR@dfo-mpo.gc.ca](mailto:RegionalLicensing.XMAR@dfo-mpo.gc.ca) (this is the same email address to which completed applications can be sent). I believe that this same group may also process the Foreign Fishing Vessel Licences, which are issued under the Coastal Fisheries Protection Regulations. I would advise that you contact the Licencing office to ask about both applications. This contact information is for the

Maritimes Region of DFO (off the coast of Nova Scotia); you will also need to apply separately for these permits from Newfoundland Region. I have copied Darren on this message as he can confirm the contact in Newfoundland Region. This is likely why it seemed that you were referring to two applications that sounded similar when we were discussing by phone – those would likely have been the two Section 52 Licence applications for the respective regions.

Should you be using marine mammal material in the chum, you may also need approval under the Marine Mammal Regulations.

Best regards,  
Jenn

**Jennifer MacDonald**

Species at Risk Biologist | Biologiste des espèces en péril

Species at Risk Management Division | Division de la gestion des espèces en péril

Ecosystem Management | Gestion des écosystèmes

Fisheries & Oceans Canada | Pêches & Océans Canada

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Email | Courriel: [jennifer.macdonald@dfo-mpo.gc.ca](mailto:jennifer.macdonald@dfo-mpo.gc.ca)

## **MacDonald, Jennifer**

---

**From:** Merriman, Catherine B  
**Sent:** July-11-18 10:09 AM  
**To:** MacDonald, Jennifer; Sweet, Marilyn; Hastings, Katherine  
**Subject:** RE: OCEARCH questions - right whale research connections, permits, in Canada

No, it didn't ...

We would like to set up meeting to discuss, I sill send you an invitation.

Thanks  
Cathy

---

**From:** MacDonald, Jennifer  
**Sent:** July-11-18 8:58 AM  
**To:** Sweet, Marilyn; Hastings, Katherine; Merriman, Catherine B  
**Subject:** RE: OCEARCH questions - right whale research connections, permits, in Canada

Happy to chat again if necessary.

Did the email that Katie and I provided you comments on ever get sent to Bob/OCEARCH?

**Jennifer MacDonald**  
Species at Risk Management Division  
(902) 407-8175

---

**From:** Sweet, Marilyn  
**Sent:** July-10-18 3:23 PM  
**To:** Hastings, Katherine; Merriman, Catherine B; MacDonald, Jennifer  
**Subject:** FW: OCEARCH questions - right whale research connections, permits, in Canada

Just going through emails and got to this one. Should we meet to discuss the update on this? Where we stand?

Mar

---

**From:** Robert Hueter [mailto:rhuetter@mote.org]  
**Sent:** June-27-18 4:42 PM  
**To:** Sweet, Marilyn; Hastings, Katherine  
**Cc:** Chris Fischer; ameite@oceans.org; Bryan Franks  
**Subject:** Re: OCEARCH questions - right whale research connections, permits, in Canada

Hi Marilyn, great to talk with you last week, just circling back wondering how your discussions went with your colleagues about our authorization request. If everything is a "go" from the marine mammal perspective, we'd like to proceed with obtaining archived, frozen material there in Nova Scotia. Please let us know as soon as possible about where things stand.

Cheers,  
Bob

**ROBERT E. HUETER, Ph.D.**

*Senior Scientist & Director, Center for Shark Research  
Perry W. Gilbert Chair in Shark Research  
Manager, Sharks & Rays Conservation Research Program  
Mote Marine Laboratory  
1600 Ken Thompson Parkway  
Sarasota, FL 34236 USA*

[rhuetter@mote.org](mailto:rhuetter@mote.org)

Tel: 941-388-1827

Fax: 941-388-4312

More info at: [www.mote.org](http://www.mote.org)

On 6/7/2018 7:05 AM, Sweet, Marilyn wrote:

Hi Bob,

Sorry, things are very busy on the marine mammal file as you can imagine.

Can you please send me more of a description of the project you are working on. Where would you be getting the marine mammal parts? Is it opportunistic? Are you bringing some from the US to Canada? Are you transporting across provincial borders? What species are you looking at using? If I had more of a project description I would be able to provide better direction on what permits may be required.

Thank you,

Mar

---

**From:** Robert Hueter [<mailto:rhuetter@mote.org>]

**Sent:** June-07-18 7:54 AM

**To:** Sweet, Marilyn; Hastings, Katherine

**Cc:** Chris Fischer; [ameite@oceanarch.org](mailto:ameite@oceanarch.org)

**Subject:** Re: OCEARCH questions - right whale research connections, permits, in Canada

Thanks Katie. Marilyn I'm happy to schedule a phone call with you today to discuss our request. Chris is on expedition now and out of range. But we know that time is of the essence, as these processes take time and our Canada research trip is only about three months away.

Bob Hueter



On Jun 7, 2018, at 6:42 AM, Hastings, Katherine <[Katherine.Hastings@dfo-mpo.gc.ca](mailto:Katherine.Hastings@dfo-mpo.gc.ca)> wrote:

Hi Bob,

Marilyn Sweet (cc'd) was in touch with you and Chris on May 25<sup>th</sup> to acknowledge receipt of your request. She is juggling a lot of priorities right now, and may not have had a chance yet to address your inquiry, but she is aware, and I am sure will do what she can to address it as soon as possible.

Best,



Katie

---

**From:** Robert Hueter [<mailto:rhoeter@mote.org>]  
**Sent:** June-06-18 5:34 PM  
**To:** Hastings, Katherine  
**Subject:** Re: OCEARCH questions - right whale research connections, permits, in Canada

Katie, we have still not heard from the advisor you mention in your past emails. It's been more than a week since the Tuesday you last said we would be called by.

Can you please help us connect with this person ASAP? Thank you for your help!

Bob

**ROBERT E. HUETER, Ph.D.**

*Senior Scientist & Director, Center for Shark Research  
Perry W. Gilbert Chair in Shark Research  
Manager, Sharks & Rays Conservation Research Program  
Mote Marine Laboratory  
1600 Ken Thompson Parkway  
Sarasota, FL 34236 USA*

[rhoeter@mote.org](mailto:rhoeter@mote.org)  
Tel: 941-388-1827  
Fax: 941-388-4312  
More info at: [www.mote.org](http://www.mote.org)

On 5/25/2018 11:50 AM, Hastings, Katherine wrote:

Hi Bob,

I have followed up with the advisor responsible. I hope and trust you will have a response by Tuesday if not before.

Thanks,  
Katie

---

**From:** Robert Hueter [<mailto:rhoeter@mote.org>]  
**Sent:** May-25-18 12:30 PM  
**To:** Hastings, Katherine  
**Cc:** Merriman, Catherine B; [chris@oceanarch.org](mailto:chris@oceanarch.org); Moors-Murphy, Hilary; Gromack, Aimee; [ameite@oceanarch.org](mailto:ameite@oceanarch.org); Vanderlaan, Angelia S.; MacDonald, Jennifer  
**Subject:** Re: OCEARCH questions - right whale research connections, permits, in Canada

Dear Katie:

I did not hear anything back on this this week. [REDACTED]  
[REDACTED] this Monday is a national holiday, so I'd appreciate it if you could see if we could get a response next Tuesday-Wednesday.

Thank you -

Bob

**ROBERT E. HUETER, Ph.D.**

*Senior Scientist & Director, Center for Shark Research  
Perry W. Gilbert Chair in Shark Research  
Manager, Sharks & Rays Conservation Research Program  
Mote Marine Laboratory  
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Fax: 941-388-4312

More info at: [www.mote.org](http://www.mote.org)

On 5/17/2018 12:34 PM, Hastings, Katherine wrote:

Hi Bob,

The urgency of your request has been conveyed to the appropriate advisors. If you have not heard anything further by next week (note that Monday is a holiday in Canada), please let me know and I will follow up on your behalf.

Thanks,  
Katie

---

**From:** Robert Hueter [<mailto:rhuetter@mote.org>]

**Sent:** May-17-18 11:36 AM

**To:** Hastings, Katherine

**Cc:** Merriman, Catherine B; [chris@oceanarch.org](mailto:chris@oceanarch.org); Moors-Murphy, Hilary; Gromack, Aimee; [ameite@oceanarch.org](mailto:ameite@oceanarch.org); Vanderlaan, Angelia S.; MacDonald, Jennifer

**Subject:** Re: OCEARCH questions - right whale research connections, permits, in Canada

OK Katie, please we need to move on this quickly, as we realize the permitting process can take some time and our expedition is planned for September. Attached is the analogous permit granted to us by NOAA, feel free to provide this up the line to the proper authorities for their information to assist.

Standing by -

Bob

**ROBERT E. HUETER, Ph.D.**

*Senior Scientist & Director, Center for Shark Research  
Perry W. Gilbert Chair in Shark Research  
Manager, Sharks & Rays Conservation Research Program  
Mote Marine Laboratory  
1600 Ken Thompson Parkway  
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Tel: 941-388-1827

Fax: 941-388-4312

More info at: [www.mote.org](http://www.mote.org)

On 5/17/2018 9:51 AM, Hastings, Katherine wrote:

Hi Bob,

That falls under the mandate of our Fisheries Management Branch. I have spoken with them, and they will be in touch soon with more details.

Katie

---

**From:** Robert Hueter

[\[mailto:rhuetter@mote.org\]](mailto:rhuetter@mote.org)

**Sent:** May-17-18 10:27 AM

**To:** Hastings, Katherine

**Cc:** Merriman, Catherine B;

[chris@oceanarch.org](mailto:chris@oceanarch.org); Moors-Murphy,

Hilary; Gromack, Aimee;

[ameite@oceanarch.org](mailto:ameite@oceanarch.org); Vanderlaan,

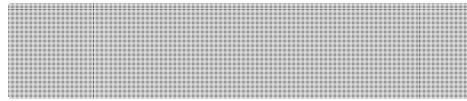
Angelia S.

**Subject:** Re: OCEARCH questions -  
right whale research connections,  
permits, in Canada

Thanks Katie, we're looking to connect with those who can assist us with obtaining a marine mammal permit and whale blubber from dead, stranded animals, to attract white sharks for our research, analogous to our NOAA permit and contacts within the NE US Stranding Network. Who is best to discuss that with us? We already have


our SARA permit for the white shark research using these methods.

Bob Hueter



On May 17, 2018, at 8:43 AM, Hastings, Katherine <[Katherine.Hastings@dfo-mpo.gc.ca](mailto:Katherine.Hastings@dfo-mpo.gc.ca)> wrote:

Hi Bob,

Thanks for your message. With respect to research collaborations, it would be best if you spoke with someone in our Science Branch. Hilary, whom Cathy included on her email below, 



however, Angelia Vanderlaan might have availability before then. I have added her to this correspondence. If you have any questions about the Species at Risk Program (e.g. recovery documents, permitting), please let me know. All published right whale recovery documents can be found here: [http://www.sararegistry.gc.ca/species/speciesDetails\\_e.cfm?sid=780#docs](http://www.sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=780#docs)

Best,  
Katie

**Katherine Hastings**

Species at Risk  
Management Division

Fisheries and Oceans  
Canada / Government  
of Canada  
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Division de la gestion  
des espèces en péril  
Pêches et Océans  
Canada /  
Gouvernement du  
Canada  
[katherine.hastings@dfo-mpo.gc.ca](mailto:katherine.hastings@dfo-mpo.gc.ca) / Tél: 902-401-0070 / Téléc: 902-426-2331

---

**From:** Robert Hueter  
[<mailto:rhuetter@mote.org>]  
**Sent:** May-17-18 9:30 AM  
**To:** Merriman,  
Catherine B  
**Cc:** [chris@oceanarch.org](mailto:chris@oceanarch.org);  
Hastings, Katherine;  
Moors-Murphy, Hilary;  
Gromack, Aimee;  
[ameite@oceanarch.org](mailto:ameite@oceanarch.org)  
**Subject:** Re:  
OCEARCH questions -  
right whale research  
connections, permits, in  
Canada

Thanks so much, Cathy.  
Excited about the  
opportunities to help  
you with right whale  
research this autumn!  
Obviously there's a  
dynamic interaction  
between right whales  
and white sharks.  
We're happy to help in  
any way possible.

Katie, can we discuss  
marine mammal needs  
for our shark research  
ASAP? Please let us  
know of your  
availability for a phone  
call, which we can  
arrange.

Bob Hueter



On May 16, 2018, at  
12:21 PM, Merriman,  
Catherine B  
<[Catherine.Merriman  
@dfo-mpo.gc.ca](mailto:Catherine.Merriman@dfo-mpo.gc.ca)>  
wrote:

Hi Dr.  
Hueter,

I got  
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answers about SARA permitting, including for the potential possession and use of right whale remains.

I am also making note of your offer to provide vessel support in the event that a right whale carcass is discovered offshore, and will include it in contingency planning.

inform  
ation.

I hope  
that  
helps  
for  
now,  
Thanks,  
Cathy

**Cathy**  
**Merri**  
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ne.mer  
riman  
@dfo-  
mpo.gc  
.ca

## MacDonald, Jennifer

---

**From:** MacDonald, Jennifer  
**Sent:** July-12-18 3:38 PM  
**To:** Sweet, Marilyn  
**Cc:** Merriman, Catherine B; Bieren, Stacey  
**Subject:** OCEARCH - info re: marine mammal use for chum

**Follow Up Flag:** Follow up  
**Flag Status:** Completed

Hi Marilyn,

I had another thought after our meeting this afternoon – what if OCEARCH proposed to bring frozen marine mammal parts from the U.S.? Should we specify in the email to them that this is not allowed (although I don't know if that is the case?) or that they would require permission to do so? I'm just thinking we should likely cover all our bases on what they may plan to do.

Thanks,  
Jenn

### Jennifer MacDonald

Species at Risk Biologist | Biologiste des espèces en péril  
Species at Risk Management Division | Division de la gestion des espèces en péril  
Ecosystem Management | Gestion des écosystèmes  
Fisheries & Oceans Canada | Pêches & Océans Canada  
P.O. Box 1006 Dartmouth N.S. | C.P. 1006 Dartmouth N.E. B2Y 4A2  
Tel | Tél: (902) 407-8175 Fax | Téléc: (902) 426-2331  
Email | Courriel: [jennifer.macdonald@dfo-mpo.gc.ca](mailto:jennifer.macdonald@dfo-mpo.gc.ca)

## **MacDonald, Jennifer**

---

**From:** Schaefer, Heidi  
**Sent:** July-12-18 3:53 PM  
**To:** MacDonald, Jennifer  
**Subject:** RE: OCEARCH update

Let's meet to discuss next week. Tuesday?

Heidi

**From:** MacDonald, Jennifer  
**Sent:** Thursday, July 12, 2018 3:36 PM  
**To:** Schaefer, Heidi <Heidi.Schaefer@dfo-mpo.gc.ca>  
**Subject:** OCEARCH update

Hi Heidi,

I just had a meeting with RM regarding permitting for OCEARCH. As you know, we have issued OCEARCH a SARA permit for research to take place later this summer/fall. They were waiting on their Foreign Vessel Clearance, which was quite a long process in getting sorted out due to some issues with approvals and appropriate conditions. Based on the meeting this afternoon, it appears the Foreign Vessel Licence has now been approved by the RDG and is now with Nfld for their approval before being issued to OCEARCH.

There are a couple of outstanding items that we will need to move forward on now that it seems they will be able to go ahead with the research:

- the SARA permit included a condition about having a DFO representative on board for at least a portion of their research activities; they are planning to arrive in Halifax on Sept 1, and we should discuss if we should be approaching C&P to include this in their planning.
- there is an outstanding question related to their use of chum; the Foreign Vessel Licence will indicate that they cannot feed marine mammal parts to sharks; however, they will be able to lure sharks with marine mammal parts (placed in some sort of tube/chum box). Marilyn is following up with OCEARCH to indicate that they would not require any additional permitting to use marine mammals UNLESS they want to use a SAR, in which case this would not be allowed with a permit. I just wanted to give you a heads-up about this.
- there were also media lines in development, I will check in with Jaz as to whether these were finalized.

Thanks,  
Jenn

### **Jennifer MacDonald**

Species at Risk Biologist | Biologiste des espèces en péril  
Species at Risk Management Division | Division de la gestion des espèces en péril  
Ecosystem Management | Gestion des écosystèmes  
Fisheries & Oceans Canada | Pêches & Océans Canada  
P.O. Box 1006 Dartmouth N.S. | C.P. 1006 Dartmouth N.E. B2Y 4A2  
Tel | Tél: (902) 407-8175 Fax | Téléc: (902) 426-2331  
Email | Courriel: [jennifer.macdonald@dfo-mpo.gc.ca](mailto:jennifer.macdonald@dfo-mpo.gc.ca)



**Merriman, Catherine B**

---

**From:** Merriman, Catherine B  
**Sent:** July-12-18 1:57 PM  
**To:** Labelle, Mark  
**Subject:** RE: OCEARCH authorization request for marine mammal parts

Okay, thank you

Cathy

---

**From:** Labelle, Mark  
**Sent:** July-12-18 1:17 PM  
**To:** Merriman, Catherine B  
**Subject:** RE: OCEARCH authorization request for marine mammal parts

Hi Catherine,  
Mike just scheduled a meeting at the same time. I have asked Scott to attend your meeting on my behalf  
FYSA  
Mark

-----Original Appointment-----

**From:** Merriman, Catherine B  
**Sent:** July-11-18 11:42 AM  
**To:** Merriman, Catherine B; Labelle, Mark; Hastings, Katherine; MacDonald, Carl; MacDonald, Jennifer; Sweet, Marilyn; Joyce, Warren; Moors-Murphy, Hilary  
**Subject:** OCEARCH authorization request for marine mammal parts  
**When:** July-12-18 2:30 PM-3:00 PM (UTC-04:00) Atlantic Time (Canada).  
**Where:** DFO CONF Dartmouth-1ChallengerDr-PL6-Gully CONF MPO

Hi, we have been discussing the request from a U.S. research / shark catching organization to use marine mammal parts and remains.

We would like to have a short meeting for concurrence on the approach and wording for the response, and hope you can attend on this short notice.

Thanks,  
Cathy

**MacDonald, Jennifer**

---

**From:** MacDonald, Jennifer  
**Sent:** July-17-18 9:44 AM  
**To:** Sweet, Marilyn  
**Subject:** RE: OCEARCH response

One further thought....should we make it more explicitly clear that not requiring a licence applies to getting marine mammal parts from someone who was licenced to have captured them? In other words, this is not permission to hunt/capture any marine mammals? I know that's clear to all of us, but just wondered if we should clearly state this?  
Jenn

**Jennifer MacDonald**  
Species at Risk Management Division  
(902) 407-8175

---

**From:** MacDonald, Jennifer  
**Sent:** July-17-18 8:13 AM  
**To:** Bowlby, Heather; Hastings, Katherine; Sweet, Marilyn; Bieren, Stacey; Mossman, Scott; MacDonald, Carl  
**Cc:** Merriman, Catherine B  
**Subject:** RE: OCEARCH response

Good morning,

I agree with Heather's point below,

Should we also include something in the email about whether or not they would be permitted to bring marine mammal parts into Canada (I don't know if this is allowed, or what would be required, but I'm just thinking of all the options they may try to explore).

Also, a small suggestion to the last sentence; instead of suggesting they contact me to apply for a SARA permit, can we say (or something similar to this):

I have copied my colleague Jennifer MacDonald with our Species at Risk Management Division as she is the contact for questions about SARA permits.

Jenn

**Jennifer MacDonald**  
Species at Risk Management Division  
(902) 407-8175

---

**From:** Bowlby, Heather  
**Sent:** July-16-18 1:33 PM  
**To:** Hastings, Katherine; Sweet, Marilyn; MacDonald, Jennifer; Bieren, Stacey; Mossman, Scott; MacDonald, Carl  
**Cc:** Merriman, Catherine B  
**Subject:** RE: OCEARCH response

Hi Marilyn,

The only change I would suggest is to make the type of permit specific at the end of the first paragraph –

For the collection or possession of a species at risk or parts of such an individual, one must apply for a Species at Risk (SARA) permit from the Department in advance of any activities.



I don't have a good suggestion for an alternative though.



Heather

**From:** Hastings, Katherine

**Sent:** Monday, July 16, 2018 11:35 AM

**To:** Sweet, Marilyn <Marilyn.Sweet@dfo-mpo.gc.ca>; MacDonald, Jennifer <Jennifer.MacDonald@dfo-mpo.gc.ca>; Bieren, Stacey <Stacey.Bieren@dfo-mpo.gc.ca>; Bowlby, Heather <Heather.Bowlby@dfo-mpo.gc.ca>; Mossman, Scott <Scott.Mossman@dfo-mpo.gc.ca>; MacDonald, Carl <Carl.MacDonald@dfo-mpo.gc.ca>

**Cc:** Merriman, Catherine B <Catherine.Merriman@dfo-mpo.gc.ca>

**Subject:** RE: OCEARCH response

Hi Marilyn,

Regarding the last sentence of the draft email:

Since, as indicated in the previous paragraph, the use of marine mammal parts to lure white sharks will be dictated by the section 52 licence (which has not yet been issued) I wonder whether you should instead say something like:

"Should your section 52 licence allow for the use of marine mammal parts to lure white sharks, please contact Jennifer MacDonald with our Species at Risk Management Division to discuss applying for a SARA permit if required."

There's not really any point in them exploring a SARA permit to use NARW blubber if they're not going to be allowed to use any marine mammal parts.

Thanks!

Katie

**Katherine Hastings**

Species at Risk Management Division  
Fisheries and Oceans Canada / Government of Canada  
[katherine.hastings@dfo-mpo.gc.ca](mailto:katherine.hastings@dfo-mpo.gc.ca) / Tel: 902-401-0070 / Fax: 902-426-2331

Division de la gestion des espèces en péril  
Pêches et Océans Canada / Gouvernement du Canada  
[katherine.hastings@dfo-mpo.gc.ca](mailto:katherine.hastings@dfo-mpo.gc.ca) / Tél: 902-401-0070 / Téléc: 902-426-2331

---

**From:** Sweet, Marilyn

**Sent:** July-16-18 11:18 AM

**To:** Hastings, Katherine; MacDonald, Jennifer; Bieren, Stacey; Bowlby, Heather; Mossman, Scott; MacDonald, Carl

**Cc:** Merriman, Catherine B

**Subject:** RE: OCEARCH response

Following our meeting last week. Can you review and let me know if this is okay. I made minimal changes from what Jen and Katie had done a few weeks ago.

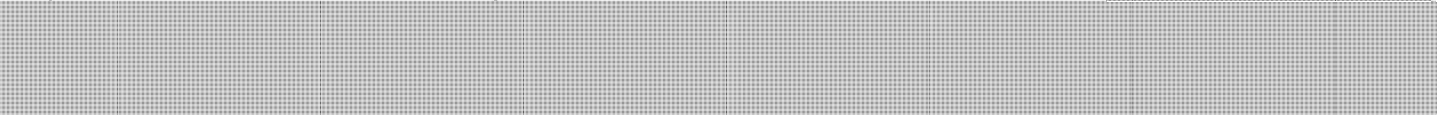
Thanks

Mar

Hi Bob,

Sorry for the delay in getting back to you. As we discussed when we spoke, there are no licences required for acquiring or using marine mammals parts for the research you are proposing, so long as they are not species listed under the *Species at Risk Act*. For example, you would be able to acquire blubber from a Minke whale and use it in your research, but the possession of any part of a species listed as threatened or endangered under SARA (such as the North Atlantic Right Whale) is prohibited under the Act. For the collection or possession of a species at risk or parts of such an individual, one must apply for a permit from the Department in advance of any activities.

Although a licence is not required for the use of marine mammal parts as detailed above, the conditions issued with the section 52 licence may restrict what can and cannot be used in the research. We will be able to give a more certain response on the use of marine mammal parts once the section 52 licence has been finalized.



To move marine mammal parts from one province to another, a Marine Mammal Transportation Licence is required. This can only be issued when you are in possession of marine mammal parts as the licence includes information on the species and parts being transported. In other words, we do not prepare and issue these licences in advance but rather on a case-by-case basis.

I hope this information helps. Once the section 52 licence has been issued I will review to see how it impacts your use of marine mammal parts. In the meantime, feel free to contact Jennifer MacDonald with our Species at Risk Management Division to discuss applying for a SARA permit.

Thanks,

Mar

Marilyn Sweet

Senior Advisor | Conseillère principale

Fisheries Management | Gestion des pêches Maritimes Region | Région des Maritimes Fisheries and Oceans Canada | Pêches et Océans Canada

1 Challenger Dr | 1 promenade Challenger

PO Box 1006 | C.P. 1006

Dartmouth, NS Canada B2Y 4A2 | Dartmouth, NÉ Canada B2Y 4A2

(902)-221-7269

[Marilyn.Sweet@dfo-mpo.gc.ca](mailto:Marilyn.Sweet@dfo-mpo.gc.ca)

## MacDonald, Jennifer

---

**From:** MacDonald, Jennifer  
**Sent:** July-18-18 1:29 PM  
**To:** Sweet, Marilyn  
**Subject:** RE: OCEARCH response

Only suggestion is I think we need to keep the text highlighted in red that was proposed to be removed. That is a key point to communicate.

**Jennifer MacDonald**  
Species at Risk Management Division  
(902) 407-8175

---

**From:** Labelle, Mark  
**Sent:** July-18-18 8:05 AM  
**To:** Sweet, Marilyn; Mossman, Scott; Bieren, Stacey; Bowlby, Heather; MacDonald, Jennifer; Merriman, Catherine B; Hastings, Katherine  
**Subject:** RE: OCEARCH response

See suggested changes for your consideration in text below...

Hi Bob,

Sorry for the delay in getting back to you. As we discussed when we spoke, there are no licences required for acquiring or using marine mammals parts for the research you are proposing, so long as they are not species listed under the *Species at Risk Act* (SARA) and as long as your organization is ~~are~~ not capturing the mammals yourselves. You would require a licence to hunt/capture ~~M~~marine ~~M~~mammals if not acquired from a response group as you noted is how you acquire the parts in the U.S. For example, you would be able to acquire blubber from a Minke whale and use it in your research, but the possession of any part of a species listed as threatened or endangered under SARA (such as the North Atlantic Right Whale) ~~is prohibited pursuant to the~~ For the collection or possession of a species at risk or parts of such ~~an individual~~ a mammal, one must apply for a Species at Risk (SARA) permit from the Department of Fisheries and Oceans in advance of any activities.

Although a licence is not required for the use of marine mammal parts as detailed above, the conditions issued with a licence issued pursuant to section 52 of the *Fishery (General) Regulations* ~~the section 52 licence~~ may restrict what can and cannot be used in the research. We will be able to give a more certain response on the use of marine mammal parts once the section 52 licence has been finalized.

To move marine mammal parts from one province to another, a Marine Mammal Transportation Licence is required. This can only be issued when you are in possession of marine mammal parts as the licence includes information on the species and parts being transported. In other words, we do not prepare and issue these licences in advance but rather on a case-by-case basis. It should also be noted that as part of the *Coastal Fisheries Protection Act*, you are not authorized to bring fish/marine mammals received from outside of Canadian fisheries waters into Canadian fisheries waters unless you seek ~~authorized through these regulations~~ authorization pursuant to the *Coastal Fisheries Protection Regulations*.

I hope this information helps. Once the section 52 licence has been issued I will review ■ to see how it impacts your use of marine mammal parts. I have copied my colleague Jennifer MacDonald with our Species at Risk Management Division as she is the contact for questions about SARA permits.

Thanks,  
Mar

---

**From:** Sweet, Marilyn  
**Sent:** July-18-18 7:33 AM  
**To:** Mossman, Scott; Bieren, Stacey; Labelle, Mark; Bowlby, Heather; MacDonald, Jennifer; Merriman, Catherine B; Hastings, Katherine  
**Subject:** RE: OCEARCH response

Hi again everyone,  
A few changes with everyone's comments. Please review and let me know how it looks by COB?  
Thanks,  
Mar

Hi Bob,  
Sorry for the delay in getting back to you. As we discussed when we spoke, there are no licences required for acquiring or using marine mammals parts for the research you are proposing, so long as they are not species listed under the *Species at Risk Act* and as long as you are not capturing the mammals yourselves. You would require a licence to hunt/capture Marine Mammals if not acquired from a response group as you noted is how you acquire the parts in the U.S. For example, you would be able to acquire blubber from a Minke whale and use it in your research, but the possession of any part of a species listed as threatened or endangered under SARA (such as the North Atlantic Right Whale) is prohibited under the Act. For the collection or possession of a species at risk or parts of such an individual, one must apply for a Species at Risk (SARA) permit from the Department in advance of any activities.

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**From:** Sweet, Marilyn  
**Sent:** July-16-18 11:18 AM  
**To:** Hastings, Katherine; MacDonald, Jennifer; Bieren, Stacey; Bowlby, Heather; Mossman, Scott; MacDonald, Carl  
**Cc:** Merriman, Catherine B  
**Subject:** RE: OCEARCH response

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Marilyn Sweet  
 Senior Advisor | Conseillère principale  
 Fisheries Management | Gestion des pêches Maritimes Region | Région des Maritimes Fisheries and Oceans Canada | Pêches et Océans Canada  
 1 Challenger Dr | 1 promenade Challenger  
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 (902)-221-7269  
[Marilyn.Sweet@dfo-mpo.gc.ca](mailto:Marilyn.Sweet@dfo-mpo.gc.ca)

## MacDonald, Jennifer

---

**From:** MacDonald, Jennifer  
**Sent:** July-18-18 7:44 AM  
**To:** Sweet, Marilyn  
**Subject:** RE: OCEARCH response

Looks good to me Marilyn – thanks! Just noted one small typo in the red below.

**Jennifer MacDonald**  
Species at Risk Management Division  
(902) 407-8175

---

**From:** Sweet, Marilyn  
**Sent:** July-18-18 7:33 AM  
**To:** Mossman, Scott; Bieren, Stacey; Labelle, Mark; Bowlby, Heather; MacDonald, Jennifer; Merriman, Catherine B; Hastings, Katherine  
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Thanks,



Mar

---

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**Sent:** July-16-18 11:18 AM  
**To:** Hastings, Katherine; MacDonald, Jennifer; Bieren, Stacey; Bowlby, Heather; Mossman, Scott; MacDonald, Carl  
**Cc:** Merriman, Catherine B  
**Subject:** RE: OCEARCH response

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Thanks

Mar

Hi Bob,

Sorry for the delay in getting back to you. As we discussed when we spoke, there are no licences required for acquiring or using marine mammals parts for the research you are proposing, so long as they are not species listed under the *Species at Risk Act*. For example, you would be able to acquire blubber from a Minke whale and use it in your research, but the possession of any part of a species listed as threatened or endangered under SARA (such as the North Atlantic Right Whale) is prohibited under the Act. For the collection or possession of a species at risk or parts of such an individual, one must apply for a permit from the Department in advance of any activities.

Although a licence is not required for the use of marine mammal parts as detailed above, the conditions issued with the section 52 licence may restrict what can and cannot be used in the research. We will be able to give a more certain response on the use of marine mammal parts once the section 52 licence has been finalized.

To move marine mammal parts from one province to another, a Marine Mammal Transportation Licence is required. This can only be issued when you are in possession of marine mammal parts as the licence includes information on the species and parts being transported. In other words, we do not prepare and issue these licences in advance but rather on a case-by-case basis.

I hope this information helps. Once the section 52 licence has been issued I will review to see how it impacts your use of marine mammal parts. In the meantime, feel free to contact Jennifer MacDonald with our Species at Risk Management Division to discuss applying for a SARA permit.

Thanks,

Mar

Marilyn Sweet

Senior Advisor | Conseillère principale

Fisheries Management | Gestion des pêches Maritimes Region | Région des Maritimes Fisheries and Oceans Canada | Pêches et Océans Canada

1 Challenger Dr | 1 promenade Challenger

PO Box 1006 | C.P. 1006

Dartmouth, NS Canada B2Y 4A2 | Dartmouth, NÉ Canada B2Y 4A2

(902)-221-7269

[Marilyn.Sweet@dfo-mpo.gc.ca](mailto:Marilyn.Sweet@dfo-mpo.gc.ca)

**Docherty, Verna**

---

**From:** MacDonald, Jennifer  
**Sent:** July-23-18 9:00 AM  
**To:** Mossman, Scott; MacDonald, Carl; Hastings, Katherine; Bowlby, Heather; Sweet, Marilyn; Merriman, Catherine B; Bieren, Stacey; Labelle, Mark  
**Cc:** Kean, Jackie; Reeves, Alan; Potter, Ted; Docherty, Verna  
**Subject:** RE: Osearch response

Morning,  
I don't have any additional comments on the SARA portions of the email.  
Jenn

**Jennifer MacDonald**  
Species at Risk Management Division  
(902) 407-8175

---

**From:** Mossman, Scott  
**Sent:** July-20-18 10:42 AM  
**To:** MacDonald, Carl; Hastings, Katherine; Bowlby, Heather; Sweet, Marilyn; MacDonald, Jennifer; Merriman, Catherine B; Bieren, Stacey; Labelle, Mark  
**Cc:** Kean, Jackie; Reeves, Alan; Potter, Ted; Docherty, Verna  
**Subject:** RE: Osearch response

Just trying to make this simple but I am wondering why there would be a s. 52 requirement at all. Going blind here because I haven't seen the licence or s. 52 associated to this. The SARA permit would be separate document.

The CFPR regs under terms and conditions (s. 11) allows DFO to prescribe gear, species, quantities, times, locations etc. Also the CFPA outlines reporting requirements

As an aside I also remember a comment at the meeting surrounding observers. The CFPA in paragraph 12(1)(e) allows for the RDG to request that observers be on board the vessel if observer coverage is something that is desired.

Scott

---

**From:** MacDonald, Carl  
**Sent:** July-20-18 9:35 AM  
**To:** Mossman, Scott; Hastings, Katherine; Bowlby, Heather; Sweet, Marilyn; MacDonald, Jennifer; Merriman, Catherine B; Bieren, Stacey; Labelle, Mark  
**Cc:** Kean, Jackie; Reeves, Alan; Potter, Ted; Docherty, Verna  
**Subject:** RE: Osearch response

Hi All,

We have never provided a Section 52 prior for these Foreign Vessel licences. The FVC acts as their section 52 licence. If there is a need or a requirement to change this process, I suggest a meeting should be held on Monday to discuss. I will not be available on Monday, but please proceed without me.

Regards,

Carl MacDonald  
Resource Management  
Fisheries & Oceans Canada | Government of Canada  
[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca) | Tel: 902-293-8257 | Fax: 902-426-7967

Regional agent principal de gestion des peches, Gestion des ressources  
Pêches et Océans Canada | Gouvernement du Canada  
[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca) | Tél: 902-293-8257 | Télécopieur: 902-426-7967

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**From:** Mossman, Scott  
**Sent:** 2018-July-20 8:56 AM  
**To:** Hastings, Katherine; Bowlby, Heather; Sweet, Marilyn; MacDonald, Jennifer; Merriman, Catherine B; Bieren, Stacey; Labelle, Mark  
**Cc:** MacDonald, Carl; Kean, Jackie  
**Subject:** RE: Oearch response

Not sure what Ottawa will do but the CFPA licence authorizing activities in Canadian waters should be a separate licence from the s. 52 FGR licence. They allow different things for a different purpose.

Scott

---

**From:** Hastings, Katherine  
**Sent:** July-20-18 8:37 AM  
**To:** Bowlby, Heather; Sweet, Marilyn; MacDonald, Jennifer; Merriman, Catherine B; Bieren, Stacey; Labelle, Mark; Mossman, Scott  
**Cc:** MacDonald, Carl; Kean, Jackie  
**Subject:** RE: Oearch response

Hi Marilyn,

From what I saw yesterday, the Foreign Vessel Clearance form has been signed off up to the RDG level in MAR Region. It includes Science and RM conditions (though I am unsure of whether it makes explicit mention of section 52). Does the FVC double as their section 52 licence or will they get another piece of paper from each region for the section 52 (as was the case for the SARA section 73 permit)? If I understand correctly, once NL Region signs off, the FVC will be sent back to Global Affairs to be issued to Oearch – is that right?

Thanks,

Katie

---

**From:** Bowlby, Heather  
**Sent:** July-20-18 8:16 AM  
**To:** Sweet, Marilyn; Hastings, Katherine; MacDonald, Jennifer; Merriman, Catherine B; Bieren, Stacey; Labelle, Mark; Mossman, Scott  
**Cc:** MacDonald, Carl; Kean, Jackie  
**Subject:** RE: Oearch response

Hi Marilyn,

It looks good from my perspective. You could consider deleting one of the 'issued' in:

'Although a licence is not required for the use of marine mammal parts as detailed above, the conditions issued with a licence issued pursuant to section 52...'

Heather

**From:** Sweet, Marilyn

**Sent:** Friday, July 20, 2018 7:42 AM

**To:** Hastings, Katherine <Katherine.Hastings@dfo-mpo.gc.ca>; MacDonald, Jennifer <Jennifer.MacDonald@dfo-mpo.gc.ca>; Merriman, Catherine B <Catherine.Merriman@dfo-mpo.gc.ca>; Bieren, Stacey <Stacey.Bieren@dfo-mpo.gc.ca>; Bowlby, Heather <Heather.Bowlby@dfo-mpo.gc.ca>; Labelle, Mark <Mark.Labelle@dfo-mpo.gc.ca>; Mossman, Scott <Scott.Mossman@dfo-mpo.gc.ca>

**Cc:** MacDonald, Carl <Carl.MacDonald@dfo-mpo.gc.ca>; Kean, Jackie <Jackie.Kean@dfo-mpo.gc.ca>

**Subject:** Osearch response

Hi everyone,

Because of all the people involved and sensitives I'm sending the email again for review before it goes to OSearch. Carl, can you confirm if they received their section 52 for shark research yet? It would change the response a bit if it was issued. Jackie, copying you in as they requested NFLD waters as well. Call if you want to discuss.

I'll need to action today or someone else will have to follow up ☹

Thanks,  
Mar

Hi Bob,

Sorry for the delay in getting back to you. As we discussed when we spoke, there are no licences required for acquiring or using marine mammals parts for the research you are proposing, so long as they are not species listed under the *Species at Risk Act* (SARA) and as long as your organization is not capturing the mammals yourselves. You would require a licence to hunt/capture marine mammals if not acquired from a response group as you noted is how you acquire the parts in the U.S. For example, you would be able to acquire blubber from a Minke whale and use it in your research, but the possession of any part of a species listed as threatened or endangered under SARA (such as the North Atlantic Right Whale) is prohibited under the Act. For the collection or possession of a species at risk or parts of such a mammal, one must apply for a SARA permit from the Department of Fisheries and Oceans in advance of any activities.

Although a licence is not required for the use of marine mammal parts as detailed above, the conditions issued with a licence issued pursuant to section 52 of the *Fishery (General) Regulations* may restrict what can and cannot be used in the research. We will be able to give a more certain response on the use of marine mammal parts once the section 52 licence has been finalized.

To move marine mammal parts from one province to another, a Marine Mammal Transportation Licence is required. This can only be issued when you are in possession of marine mammal parts as the licence includes information on the species and parts being transported. In other words, we do not prepare and issue these licences in advance but rather on a case-by-case basis. It should also be noted that as part of the *Coastal Fisheries Protection Act*, you are not authorized to bring fish/marine mammals received from outside of

Canadian fisheries waters into Canadian fisheries waters unless you seek authorization pursuant to the *Coastal Fisheries Protection Regulations*.

I hope this information helps. Once the section 52 licence has been issued I will review it to see how it impacts your use of marine mammal parts. I have copied my colleague Jennifer MacDonald with our Species at Risk Management Division as she is the contact for questions about SARA permits.

Thanks,  
Mar

## Cleveland, Charlene

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**From:** General, Paulette  
**Sent:** 2018-July-23 4:31 PM  
**To:** Cleveland, Charlene  
**Subject:** FW: IGR-351: US. MSR Request OCEARCH (Sep 1 - Oct 31 2018) Fwd to Anne July 23 PG  
**Attachments:** RATS clarification letter.pdf; IGR-351 Letter of Authorization.pdf

Hi Charlene,

I forwarded this to Anne to respond/redirect on July 23<sup>rd</sup> because they are looking for a response by the end of the week. I meant to cc you and forgot!

---

**From:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO)  
**Sent:** July-23-18 3:30 PM  
**To:** Licence Maritimes / Permis Maritimes (DFO/MPO)  
**Cc:** Farr, Connie; NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO)  
**Subject:** IGR-351: US. MSR Request OCEARCH (Sep 1 - Oct 31 2018) Fwd to Anne July 23 PG

Good afternoon,

We received the attached from the proponent via the US State Department, seeking clarification on several items related to the approved OCEARCH cruise.

The key questions are reproduced below for your consideration (see attached for the full letter):

1. In paragraph 1 of page 2, your letter states, *“Marine mammal parts may not be offered to sharks for feeding or consumption, may not be ingested by sharks, and pieces of marine mammal tissue may not be thrown overboard to attract sharks.”* We interpret this to mean we are permitted to use allowable marine mammal parts (e.g. minke whale blubber), legally obtained within the individual province, as bait on our hooks to capture the sharks, but not allow the sharks to swallow the food. This is identical to the limitations that NOAA places on us in U.S. federal waters. We would prefer not to have this limitation – for the sharks are there precisely because they are naturally feeding on marine mammals – but if Canada insists on this limitation, we can abide by it. Furthermore we interpret your letter to allow us to use authorized marine mammal parts as chum that is contained inside tubes or cages from which scent emanates to attract the sharks to our fishing spot, as per our procedures approved by NOAA in U.S. waters. We understand that we are not permitted to throw pieces of marine mammals freely into the water, which we never do. We also understand that we cannot transport legally obtained marine mammal material from one province to another province without the prior approval of DFO. We have been in touch with the marine mammal authorities at DFO on all of our planned procedures and they have stated that we need no further permits (except to transport material between provinces) as long as we are using non-endangered marine mammals, such as blubber from minke whales. *If we have misinterpreted any of these regulations, please contact us immediately.*

2. We are working with a Canadian researcher, Dr. Nigel Hussey of the University of Windsor, on this expedition and Dr. Hussey is interested in conducting some research with us on Greenland Sharks. This species was not on our requested list. *We ask for guidance on what would be required at this stage to add the Greenland Shark to our list of authorized research species.*

Would it be possible to provide clarification on these questions? Global Affairs has requested that a response be provided by the end of the week.

Thank you, and best wishes,

Andrew

July 20, 2018

Nancy Clark  
Deputy Director  
Defence and Security Relations Division  
Global Affairs Canada  
125 Sussex Drive  
Ottawa, Ontario, Canada K1A 0G2

Dear Deputy Director Clark:

We at OCEARCH wish to thank you for your authorization letter of July 16, 2018, consenting to our request to conduct vital marine research in waters of Atlantic Canada this coming September-October. We are in the final planning stages of this expedition now and very much look forward to this exciting work off Nova Scotia and Newfoundland.

We would like to clarify a few points in your letter and the form titled, "Foreign Fishing Vessel Licence Approval Form – Scientific Research," which came with your letter, as follows:

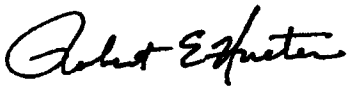
1. In paragraph 1 of page 2, your letter states, "*Marine mammal parts may not be offered to sharks for feeding or consumption, may not be ingested by sharks, and pieces of marine mammal tissue may not be thrown overboard to attract sharks.*" We interpret this to mean we are permitted to use allowable marine mammal parts (e.g. minke whale blubber), legally obtained within the individual province, as bait on our hooks to capture the sharks, but not allow the sharks to swallow the food. This is identical to the limitations that NOAA places on us in U.S. federal waters. We would prefer not to have this limitation – for the sharks are there precisely because they are naturally feeding on marine mammals – but if Canada insists on this limitation, we can abide by it. Furthermore we interpret your letter to allow us to use authorized marine mammal parts as chum that is contained inside tubes or cages from which scent emanates to attract the sharks to our fishing spot, as per our procedures approved by NOAA in U.S. waters. We understand that we are not permitted to throw pieces of marine mammals freely into the water, which we never do. We also understand that we cannot transport legally obtained marine mammal material from one province to another province without the prior approval of DFO. We have been in touch with the marine mammal authorities at DFO on all of our planned procedures and they have stated that we need no further permits (except to transport material between provinces) as long as we are using non-endangered marine mammals, such as blubber from minke whales. ***If we have misinterpreted any of these regulations, please contact us immediately.***
2. We are working with a Canadian researcher, Dr. Nigel Hussey of the University of Windsor, on this expedition and Dr. Hussey is interested in conducting some research with us on Greenland Sharks. This species was not on our requested list. ***We ask for guidance on what would be required at this stage to add the Greenland Shark to our list of authorized research species.***
3. On the Approval Form, there are a number of errors on the first page that apparently were mistakenly done by the Science Branch. We wish to correct these errors here, as follows: a) Under 1.(1) of the form, our research expedition absolutely will contribute to the Canadian scientific community, as we are engaging with a number of collaborators in Canadian academia and agencies to participate in these studies; b) Our research also absolutely contributes to the International scientific community, as our tracking data are open-access to all scientists (as well



as the public) and our resulting publications are distributed through the world's scientific community studying sharks; c) Canadian scientists, therefore, will absolutely have access to the research data collected on this expedition, contrary to what is indicated on 1.(2) of the form, and Canadian scientists absolutely will be participating, contrary to what is checked in 1.(3); and d) We question the checking of "Yes" for 1.(5) on the form asking if this or a similar request has been previously approved (we assume by the Canadian government), as our request to your office in 2018 is the first such request we have made – unless this refers to our SARA permit granted by DFO earlier this year for the same expedition. ***Please make these changes or clarify to us why these choices were checked on the form.*** A scan of the form is attached with this letter.

We are grateful for your assistance in resolving these questions and for your letter authorizing our activities in Atlantic Canada.

Sincerely yours,

A handwritten signature in black ink, appearing to read "Robert E. Hueter". The signature is fluid and cursive, with the first name "Robert" being more prominent.

Robert E. Hueter, Ph.D.  
Chief Science Advisor, OCEARCH

Encl: Approval Form

## Foreign Fishing Vessel Licence Approval Form Scientific Research

Year: 2018 Country: USA  
Vessel Name: OCEARCH  
Research objectives: Expedition Nova Scotia – F2017-120  
Location of fishing activity: 5ZE, 4X, 4VsW  
Gear: Hook and Line, Mousetrap Drum Rig, Specially designed Lift System, Chase Boats and other oceanographic equipment

Dates of fishing activity: September 1 to October 31, 2018

### 1. To be completed by Science Branch

- (1) Does this research activity contribute to:
- |                                      |   |  |   |
|--------------------------------------|---|--|---|
| • Canadian scientific community      | Yes <input checked="" type="checkbox"/> | No <input checked="" type="checkbox"/> | Unknown <input type="checkbox"/>            |
| • Canadian industry                  | Yes <input type="checkbox"/>            | No <input type="checkbox"/>            | Unknown <input checked="" type="checkbox"/> |
| • International scientific community | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/>            | Unknown <input checked="" type="checkbox"/> |
- (2) Will Canadian scientists have access to the research data
- Yes ☒ No ☒
- (3) Will Canadian scientists be participating
- Yes ☒ No ☒
- (4) Primary species at which research is directed
- |                                    | <u>Shark Species including White Shark</u> |                             |     |
|------------------------------------|--|-----------------------------|-----|
| • highly transboundary as adult    | Yes <input type="checkbox"/>               | No <input type="checkbox"/> | n/a |
| • somewhat transboundary as adult  | Yes <input checked="" type="checkbox"/>    | No <input type="checkbox"/> |     |
| • sedentary as adult               | Yes <input type="checkbox"/>               | No <input type="checkbox"/> | n/a |
| • endangered or threatened species | Yes <input type="checkbox"/>               | No <input type="checkbox"/> | n/a |
- (5) Has this or a similar request been approved in previous years, i. e. long-term data series
- Yes ☒ ? No ☐

### (6) Comments:

Proposed science conditions:

1. A copy of all data collected during the marine science research activities that are the subject of this consent letter is to be sent by email to the following email address, and should include 'IGR-351: US MSR Request OCEARCH (Sep 1 – Oct 31 2018)' in the subject line:  
[Shark.mar@dfo-mpo.gc.ca](mailto:Shark.mar@dfo-mpo.gc.ca)



UNCLASSIFIED  
IGR-351

July 16, 2018

Mrs. Chever Voltmer  
Deputy Director  
Ocean Science Policy and Authorizations  
Office of Ocean and Polar Affairs  
United States Department of State  
2201 C Street NW  
Washington, D.C. 20520

Dear Mrs. Voltmer,

**Authorization for U.S. Marine Scientific Research Vessel OCEARCH**  
(September 1 – October 31, 2018)

I am pleased to advise that the Government of Canada grants its consent to the request for the U.S. Research Vessel OCEARCH to undertake marine scientific research in areas under the national jurisdiction of Canada during the above mentioned dates.

Certain specifics outlining the marine scientific activities of the OCEARCH are contained in the attached Foreign Fishing Vessel Licence Approval Form. This licence must be signed and will be issued directly to the vessel's agent, Mr. Chris Fisher, prior to September 1, 2018. It must be kept on board during activities in Canadian waters.

In addition, we request the following:

- That a copy of all data collected during this cruise be sent by email to the following address ([Shar.mar@dfo-mpo.gc.ca](mailto:Shar.mar@dfo-mpo.gc.ca)), and that the proponent include 'IGR-351: U.S. MSR Request OCEARCH (Sep 1 – Oct 31 2018)' in the subject line; and,
- That a copy of the final report incorporating information obtained from the marine scientific research that is the subject of this application be sent no later than two (2) years after the end date of the timeframe specified in the consent letter to the following address:

Regional Director, Science  
Maritimes Region  
Fisheries and Oceans Canada  
Bedford Institute of Oceanography  
1 Challenger Drive  
Dartmouth, NS, B2Y 4A2

Canada

The licence holder is authorized to conduct research on the following shark species: White Shark, Blue Shark, Porbeagle Shark, Common Thresher Shark, and Shortfin Mako Shark. Marine mammal parts may not be offered to sharks for feeding or consumption, may not be ingested by sharks, and pieces of marine mammal tissue may not be thrown overboard to attract sharks. Efforts to lure, capture, or tag sharks is not authorized to occur in close proximity (defined as within two nautical miles) of endangered whale species, including North Atlantic Right Whales (*Eubalaena glacialis*). A section 73 harm permit is required under the Species at Risk Act, and must be attached to the foreign licence when conducting shark study operations. While operating under this licence, the proponent must abide by the marine mammal interactions and management measures attached to this form.

Please note that the vessel and its crew must comply with applicable rules and regulations for any activities outside of the scope of the approved MSR, including local community engagement through presentations, events and ship tours.

As this application indicates there will be research activity taking place inside Canada's territorial waters, I would like to remind the OCEARCH of the Canada Border Services Agency (CBSA) - marine reporting requirements:

**Canada Border Services Agency (CBSA) - marine reporting requirements:**

Foreign expeditions arriving in Canada by research vessel and entering Canada's internal waters or territorial sea are required to report to the nearest Canada Border Services Agency (CBSA) Marine Reporting office.

CBSA Marine Reporting Offices: (Atlantic) Phone: 902-426-5738 / Fax: 902-426-1007

Vessels are required to transmit the following completed forms: **Form A6** General Declaration and **Form A6A** Freight/Cargo Manifest. The forms can be obtained electronically via the links below:

**Form A6:** <http://www.cbsa-asfc.gc.ca/publications/forms-formulaires/a6.pdf>

**Form A6A:** <http://www.cbsa-asfc.gc.ca/publications/forms-formulaires/a6a.pdf>

We are pleased that the scientific results and all the data from this cruise will be freely and generously shared and request copies of the preliminary and final cruise reports.

Yours sincerely,

A handwritten signature in black ink, appearing to read 'N Clark', with a stylized, cursive script.

Nancy Clark,  
Deputy Director  
Defence and Security Relations Division

## Foreign Fishing Vessel Licence Approval Form Scientific Research

Year: 2018 Country: USA  
Vessel Name: OCEARCH  
Research objectives: Expedition Nova Scotia – F2017-120  
Location of fishing activity: 5ZE, 4X, 4VsW  
Gear: Hook and Line, Mousetrap Drum Rig, Specially designed Lift System, Chase Boats and other oceanographic equipment

Dates of fishing activity: September 1 to October 31, 2018

### 1. To be completed by Science Branch

(1) Does this research activity contribute to:

- |                                      |                              |  |   |
|--------------------------------------|------------------------------|--|---|
| • Canadian scientific community      | Yes <input type="checkbox"/> | No <input checked="" type="checkbox"/> | Unknown <input type="checkbox"/>            |
| • Canadian industry                  | Yes <input type="checkbox"/> | No <input type="checkbox"/>            | Unknown <input checked="" type="checkbox"/> |
| • International scientific community | Yes <input type="checkbox"/> | No <input type="checkbox"/>            | Unknown <input checked="" type="checkbox"/> |

(2) Will Canadian scientists have access to the research data

Yes ☐ No ☒

(3) Will Canadian scientists be participating

Yes ☐ No ☒

(4) Primary species at which research is directed

Shark Species including White Shark

- |                                    |   |                             |     |
|------------------------------------|---|-----------------------------|-----|
| • highly transboundary as adult    | Yes <input type="checkbox"/>            | No <input type="checkbox"/> | n/a |
| • somewhat transboundary as adult  | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/> |     |
| • sedentary as adult               | Yes <input type="checkbox"/>            | No <input type="checkbox"/> | n/a |
| • endangered or threatened species | Yes <input type="checkbox"/>            | No <input type="checkbox"/> | n/a |

(5) Has this or a similar request been approved in previous years, i. e. long-term data series

Yes ☒ No ☐

(6) Comments:

Proposed science conditions:

1. A copy of all data collected during the marine science research activities that are the subject of this consent letter is to be sent by email to the following email address, and should include 'IGR-351: US MSR Request OCEARCH (Sep 1 – Oct 31 2018)' in the subject line:  
Shark.mar@dfo-mpo.gc.ca

2. A copy of the final report produced that incorporates information obtained from the marine scientific research that is the subject of this application is to be sent no later than two (2) years after the end date of the timeframe specified in this consent letter to the following address:

Regional Director, Science  
Maritimes Region  
Fisheries and Oceans Canada  
Bedford Institute of Oceanography  
1 Challenger Drive  
Dartmouth, NS B2Y 4A2

Recommend Approval      Yes X      No   

(electronic signature)

Alain Vezina  
Regional Director, Science

## 2. To be completed by Ecosystem Management

- (1) Does the area of research activity fall within the boundaries of any:

- Marine Protected Area (MPA)      N/A
- area closed to Canadian fishers because of habitat concerns      N/A
- integrated management area      N/A
- area with habitat sensitivities      N/A

- (2) If yes to a MPA, does the research support the MPA objectives?

N/A

- (3) If yes to any other area, could the research activity be carried out with minimal impact because of the gear type or with restrictions

Yes (see note below)

### Comments:

### Whales

- R/V to report sightings of North Atlantic right whales (same day if possible) to DFO Maritimes Region. Contact: 1-844-800-8568; [XMARWhalesightings@dfo-mpo.gc.ca](mailto:XMARWhalesightings@dfo-mpo.gc.ca). All whale records (post voyage), including location, date and photos, to be submitted to DFO Maritimes Region.
- R/V to adhere to guidance contained in Canadian Coast Guard Annual Notice to Mariners: A2 - 5. GENERAL GUIDELINES FOR AQUATIC SPECIES AT RISK AND IMPORTANT MARINE MAMMAL AREAS: Grand Manan Basin Critical Habitat and Roseway Basin Critical Habitat/Area To Be Avoided. See: <https://www.notmar.gc.ca/publications/annual-annuel/section-a/a5-en.php>
- R/V to report any collisions with whales, entangled whales or dead whales to the whale emergency hotline (1-866-567-6277), VHF Channel 16, or Fundy Traffic VHF Channel 14.





- There will be a string of beacons on a line. It is not possible to travel between the beacons with a research vessel.
- It is possible to travel a suitable distance alongside a pelagic longline set.

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**A section 73 harm permit is required under the Species at Risk Act (SARA) and must be attached to the foreign licence when conducting shark study operations.**

---

Recommend Approval

Yes ☒

No ☐



**Annette Daley  
A/Regional Director,  
Fisheries Management**

**Deadline for approval/non-approval:** \_\_\_\_\_

Approved ☒

Not Approved ☐



**Mary-Ellen Valkenier  
Regional Director General  
Maritimes Region  
Fisheries & Oceans Canada**

Date: JUN 11 2018

**Additional Conditions:** DFO – NL Resource Management

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**MARINE MAMMALS**

While operating under this licence, you must abide by the conditions as described in Schedule 38 (MARINE MAMMAL INTERACTIONS AND MANAGEMENT MEASURES) which must be attached to this licence.

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## Schedule 38 – MARINE MAMMAL INTERACTIONS AND MANAGEMENT

Your licence is subject to the following conditions. These conditions are part of your licence and must remain attached to your fishing licence.

### DEFINITIONS

1. For the purposes of these conditions lethal and non-lethal marine mammal interactions is defined as interactions that include bycatch or collision of all marine mammals and all sightings of marine mammals entangled in fishing gear.
2. For the purposes of these conditions primary buoy is defined as a buoy or other floating device attached to fishing gear.
3. For the purposes of these conditions a secondary buoy is defined as: a buoy or other floating device attached to a primary buoy.

### MARINE MAMMAL INTERACTION REPORTING

4. You must provide information regarding all lethal and non-lethal marine mammal interactions during fishing trips.
5. For the purpose of section 4, lethal and non-lethal interactions are defined in subsection 1.
6. You must complete the DFO Marine Mammal Interaction Form and it must be submitted as per the instructions provided on the form. This form is located online at <http://www.dfo-mpo.gc.ca/fm-gp/mammals-mammiferes/report-rapport-eng.html>. This form can be completed and submitted online or if you prefer, you can fax or email the printed form.

#### Reporting Lost Gear

7. You must report any lost fishing gear, including the last known latitude and longitude positions, to the nearest DFO Conservation and Protection Detachment office within 48 hours after the fishing trip ends.

#### Reporting Sightings of North Atlantic Whale

8. You must report all sightings of North Atlantic Right Whales by calling 1-888-895-3003 as soon as possible or at least within 24 hours after sighting.

### GEAR RESTRICTIONS

This section applies to the following fisheries: American Plaice, Greenland Halibut, Monkfish, Northern Cod, Snow crab, Whelk and Winter Flounder .

#### **Rope on Water Surface**

9. For the purpose of these licence conditions, a primary buoy is defined in subsection 2. For the purpose of these licence conditions, a secondary buoy is defined in subsection 3.

10. A maximum of 6.4 meters of rope shall be used when attaching a secondary buoy to a primary buoy.

11. No rope attaching a crab trap to a primary buoy shall remain floating on the surface of the water after the crab trap has been set.

#### **Sequential Numbering**

12. While fishing under this licence, you must identify each buoy with a sequential number.

(For example if you use 20 buoys among all of your fishing gear then each buoy must be sequentially numbered from 1 to 20. Buoy 1 must be marked as #1, buoy 2 must be marked as #2 and so forth, the last buoy would be marked as #20.)

13. The sequential number referred above must be painted on or otherwise securely affixed to the primary buoy.

14. The sequential number must be legible and be solid block Arabic numerals:

- a) without ornamentation;
- b) written in a smaller or bigger scale than the vessel registration as to be capable of differentiating the number from the vessel registration ; and
- c) in a color that contrast with their background.

#### **INFORMATION**

15. If you have a whale (live or dead) caught in your fishing gear you can call 1-888-895-3003 for assistance.

16. If you see a whale or turtle, you can email [telljack@dfo-mpo.gc.ca](mailto:telljack@dfo-mpo.gc.ca) or tweet Jack@DFO\_NL #whale or #leatherback

## MacDonald, Jennifer

---

**From:** Schaefer, Heidi  
**Sent:** July-23-18 8:50 AM  
**To:** MacDonald, Jennifer  
**Subject:** RE: SARA permits - information tracking and enforcement request

Ok. Perhaps we should tack this topic on to this morning's meeting with Donald.

H

**From:** MacDonald, Jennifer  
**Sent:** Monday, July 23, 2018 8:45 AM  
**To:** Schaefer, Heidi <Heidi.Schaefer@dfo-mpo.gc.ca>  
**Subject:** FW: SARA permits - information tracking and enforcement request

FYI

**Jennifer MacDonald**  
Species at Risk Management Division  
(902) 407-8175

---

**From:** Webster, Corey J  
**Sent:** July-20-18 2:10 PM  
**To:** MacDonald, Jennifer  
**Subject:** RE: SARA permits - information tracking and enforcement request

Jennifer,

Just wanted to follow-up. I wanted to confirm that C&P will not be able to help monitor the OCEARCH group.

Thanks

**Corey Webster**  
*A/Chief, Program and Operational Readiness / Chef, Préparation aux programmes et opérations*  
Maritimes Region, Conservation & Protection, DFO  
Région des Maritimes, Conservation et Protection, MPO  
16 Endeavour Dr./ 16 prom. Endeavour  
PO Box 1006 / C.P. 1006  
Dartmouth, NS / N-É B2Y 4A2  
**Tel:** (902) 407-7071 | **Cell :** [REDACTED]  
Government of Canada | Gouvernement du Canada |  
**E-Mail / Courrier électronique:** [corey.webster@dfo-mpo.gc.ca](mailto:corey.webster@dfo-mpo.gc.ca)



**From:** MacDonald, Jennifer  
**Sent:** Tuesday, July 17, 2018 4:25 PM

**To:** Webster, Corey J <Corey.Webster@dfo-mpo.gc.ca>

**Subject:** SARA permits - information tracking and enforcement request

Hi Corey,

I work within the Species at Risk group and am responsible for the review of permits for research/scientific activities under SARA. I wanted to touch base with you about a couple of questions (I was actually in the middle of writing this message, when Jeanette's request to share permitting information with you regarding NEAq popped up, so my first question to you may be particularly relevant).

First, I have been sending our SARA permits to Scott Mossman as we issue them, so that C&P has copies of the permits, as well as a list of all currently valid SARA permits; I was just recently given your name as the SARA contact – should I be sending the SARA permits to you now? If so, would you like me to forward to you the most recent permits/summary table that I sent to Scott?

Second, we issued a SARA permit to the American shark research group OCEARCH, to carry out some tagging activities in Canadian waters this coming September/October. As they are catching the sharks in order to tag them, they also require a s.52 Licence/Foreign Vessel Licence. That licencing is in progress, although likely to be approved shortly. As part of the SARA permit, a condition was included that a DFO representative accompany the research team for a portion of their activities (they are planning to be stationed in Mahone Bay initially and it sounds like they will be making day trips out into the bay for tagging). I was hoping I could discuss with you whether it would be possible for C&P to accompany the researchers at some point in support of fulfilling this condition of the SARA permit. I apologize as we should have discussed this with you in advance of issuing the permit; however, if there is still an opportunity to discuss this and fit this into C&P's workplan, that would be appreciated. As an aside, I was at a meeting last week regarding OCEARCH's Foreign Vessel Licence; Scott Mossman was in attendance and [REDACTED] did suggest that C&P may want to be present in Mahone Bay during some of the research.

If it would be easier to discuss by phone, please don't hesitate to give me a call. I can also send you a copy of the SARA Permit issued to OCEARCH if you don't have access to a copy.

Thanks so much,  
Jenn

**Jennifer MacDonald**

Species at Risk Biologist | Biologiste des espèces en peril

Species at Risk Management Division | Division de la gestion des espèces en péril

Ecosystem Management | Gestion des écosystèmes

Fisheries & Oceans Canada | Pêches & Océans Canada

P.O. Box 1006 Dartmouth N.S. | C.P. 1006 Dartmouth N.E. B2Y 4A2

Tel | Tél: (902) 407-8175 Fax | Téléc: (902) 426-2331

Email | Courriel: [jennifer.macdonald@dfo-mpo.gc.ca](mailto:jennifer.macdonald@dfo-mpo.gc.ca)

## Docherty, Verna

---

**From:** Bieren, Stacey  
**Sent:** July-27-18 2:42 PM  
**To:** Docherty, Verna; Merriman, Catherine B; MacDonald, Carl  
**Cc:** Potter, Ted  
**Subject:** RE: IGR-351: US. MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Yes their interpretation is correct of the clause referenced, and I haven't any concerns with adding Greenland Shark to the authorization.

Stacey Bieren  
Senior Advisor | Conseillère principale  
Fisheries Management | Gestion des pêches Maritimes Region | Région des Maritimes Fisheries and Oceans Canada |  
Pêches et Océans Canada  
1 Challenger Dr | 1 promenade Challenger  
PO Box 1006 | C.P. 1006  
Dartmouth, NS Canada B2Y 4A2 | Dartmouth, NÉ Canada B2Y 4A2  
(902)-240-6903  
[Stacey.Bieren@dfo-mpo.gc.ca](mailto:Stacey.Bieren@dfo-mpo.gc.ca)

**From:** Docherty, Verna  
**Sent:** Friday, July 27, 2018 2:05 PM  
**To:** Bieren, Stacey <[Stacey.Bieren@dfo-mpo.gc.ca](mailto:Stacey.Bieren@dfo-mpo.gc.ca)>; Merriman, Catherine B <[Catherine.Merriman@dfo-mpo.gc.ca](mailto:Catherine.Merriman@dfo-mpo.gc.ca)>;  
MacDonald, Carl <[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca)>  
**Subject:** FW: IGR-351: US. MSR Request OCEARCH (Sep 1 - Oct 31 2018)  
**Importance:** High

Hi folks,

My apologies because I believe this was missed within Licensing and Global Affairs has requested a response today.

For today, I'm asking if you can:

- 1) confirm whether OCEARCH's interpretation of the clause referenced below is correct; and
- 2) advise whether there are likely to be any concerns on authorizing them to conduct research on Greenland Shark. If we know that this will not be a possibility, I'd like to tell them now. Otherwise, we can tell them about the process.

Thanks,  
Verna

---

**From:** Licence Maritimes / Permis Maritimes (DFO/MPO)  
**Sent:** July-27-18 1:42 PM  
**To:** Docherty, Verna  
**Subject:** FW: IGR-351: US. MSR Request OCEARCH (Sep 1 - Oct 31 2018)  
**Importance:** High

Hi,

See below.

Kira

**From:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO)

**Sent:** July-27-18 1:30 PM

**To:** Licence Maritimes / Permis Maritimes (DFO/MPO) <[RegionalLicensing.XMAR@dfo-mpo.gc.ca](mailto:RegionalLicensing.XMAR@dfo-mpo.gc.ca)>

**Cc:** Lavigne, Élise <[Elise.Lavigne@dfo-mpo.gc.ca](mailto:Elise.Lavigne@dfo-mpo.gc.ca)>; NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO) <[Vessel-Clearance.XNCR@dfo-mpo.gc.ca](mailto:Vessel-Clearance.XNCR@dfo-mpo.gc.ca)>; Cleveland, Charlene <[Charlene.Cleveland@dfo-mpo.gc.ca](mailto:Charlene.Cleveland@dfo-mpo.gc.ca)>

**Subject:** RE: IGR-351: US. MSR Request OCEARCH (Sep 1 - Oct 31 2018)

**Importance:** High

Good afternoon,

Just wanted to follow up on the below request related to the OCEARCH cruise.

Best wishes,

Andrew

---

**From:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO)

**Sent:** July-23-18 2:30 PM

**To:** Licence Maritimes / Permis Maritimes (DFO/MPO)

**Cc:** Farr, Connie; NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO)

**Subject:** IGR-351: US. MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Good afternoon,

We received the attached from the proponent via the US State Department, seeking clarification on several items related to the approved OCEARCH cruise.

The key questions are reproduced below for your consideration (see attached for the full letter):

1. In paragraph 1 of page 2, your letter states, *"Marine mammal parts may not be offered to sharks for feeding or consumption, may not be ingested by sharks, and pieces of marine mammal tissue may not be thrown overboard to attract sharks."* We interpret this to mean we are permitted to use allowable marine mammal parts (e.g. minke whale blubber), legally obtained within the individual province, as bait on our hooks to capture the sharks, but not allow the sharks to swallow the food. This is identical to the limitations that NOAA places on us in U.S. federal waters. We would prefer not to have this limitation – for the sharks are there precisely because they are naturally feeding on marine mammals – but if Canada insists on this limitation, we can abide by it. Furthermore we interpret your letter to allow us to use authorized marine mammal parts as chum that is contained inside tubes or cages from which scent emanates to attract the sharks to our fishing spot, as per our procedures approved by NOAA in U.S. waters. We understand that we are not permitted to throw pieces of marine mammals freely into the water, which we never do. We also understand that we cannot transport legally obtained marine mammal material from one province to another province without the prior approval of DFO. We have been in touch with the marine mammal authorities at DFO on all of our planned procedures and they have stated that we need no further permits (except to transport material between provinces) as long as we are using non-endangered marine mammals, such as blubber from minke whales. *If we have misinterpreted any of these regulations, please contact us immediately.*

2. We are working with a Canadian researcher, Dr. Nigel Hussey of the University of Windsor, on this expedition and Dr. Hussey is interested in conducting some research with us on Greenland Sharks. This species was not on our requested list. *We ask for guidance on what would be required at this stage to add the Greenland Shark to our list of authorized research species.*

Would it be possible to provide clarification on these questions? Global Affairs has requested that a response be provided by the end of the week.

Thank you, and best wishes,

Andrew



## Cleveland, Charlene

---

**From:** Docherty, Verna  
**Sent:** 2018-July-27 3:19 PM  
**To:** Licence Maritimes / Permis Maritimes (DFO/MPO); NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO)  
**Cc:** Cleveland, Charlene  
**Subject:** RE: IGR-351: US. MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Good afternoon,

Re: question 1, we confirm that the interpretation laid out below is correct. While the proponent indicates they would prefer not to have these limitations, these will remain a condition to the authorization.

Re: question 2, we require the proponent submit an amended application providing details on the proposed research. Approvals will be sought through the same process as used for the original request and there should be no expectation of a shortened timeline.

Regards,  
Verna

p.s. please remove Connie Farr from your distribution and add Charlene Cleveland.

---

**From:** Licence Maritimes / Permis Maritimes (DFO/MPO)  
**Sent:** July-27-18 1:42 PM  
**To:** Docherty, Verna  
**Subject:** FW: IGR-351: US. MSR Request OCEARCH (Sep 1 - Oct 31 2018)  
**Importance:** High

Hi,

See below.

Kira

**From:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO)  
**Sent:** July-27-18 1:30 PM  
**To:** Licence Maritimes / Permis Maritimes (DFO/MPO) <[RegionalLicensing.XMAR@dfo-mpo.gc.ca](mailto:RegionalLicensing.XMAR@dfo-mpo.gc.ca)>  
**Cc:** Lavigne, Élise <[Elise.Lavigne@dfo-mpo.gc.ca](mailto:Elise.Lavigne@dfo-mpo.gc.ca)>; NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO) <[Vessel-Clearance.XNCR@dfo-mpo.gc.ca](mailto:Vessel-Clearance.XNCR@dfo-mpo.gc.ca)>; Cleveland, Charlene <[Charlene.Cleveland@dfo-mpo.gc.ca](mailto:Charlene.Cleveland@dfo-mpo.gc.ca)>  
**Subject:** RE: IGR-351: US. MSR Request OCEARCH (Sep 1 - Oct 31 2018)  
**Importance:** High

Good afternoon,

Just wanted to follow up on the below request related to the OCEARCH cruise.

Best wishes,

Andrew

**From:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO)  
**Sent:** July-23-18 2:30 PM  
**To:** Licence Maritimes / Permis Maritimes (DFO/MPO)  
**Cc:** Farr, Connie; NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO)  
**Subject:** IGR-351: US. MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Good afternoon,

We received the attached from the proponent via the US State Department, seeking clarification on several items related to the approved OCEARCH cruise.

The key questions are reproduced below for your consideration (see attached for the full letter):

1. In paragraph 1 of page 2, your letter states, "*Marine mammal parts may not be offered to sharks for feeding or consumption, may not be ingested by sharks, and pieces of marine mammal tissue may not be thrown overboard to attract sharks.*" We interpret this to mean we are permitted to use allowable marine mammal parts (e.g. minke whale blubber), legally obtained within the individual province, as bait on our hooks to capture the sharks, but not allow the sharks to swallow the food. This is identical to the limitations that NOAA places on us in U.S. federal waters. We would prefer not to have this limitation – for the sharks are there precisely because they are naturally feeding on marine mammals – but if Canada insists on this limitation, we can abide by it. Furthermore we interpret your letter to allow us to use authorized marine mammal parts as chum that is contained inside tubes or cages from which scent emanates to attract the sharks to our fishing spot, as per our procedures approved by NOAA in U.S. waters. We understand that we are not permitted to throw pieces of marine mammals freely into the water, which we never do. We also understand that we cannot transport legally obtained marine mammal material from one province to another province without the prior approval of DFO. We have been in touch with the marine mammal authorities at DFO on all of our planned procedures and they have stated that we need no further permits (except to transport material between provinces) as long as we are using non-endangered marine mammals, such as blubber from minke whales. *If we have misinterpreted any of these regulations, please contact us immediately.*

2. We are working with a Canadian researcher, Dr. Nigel Hussey of the University of Windsor, on this expedition and Dr. Hussey is interested in conducting some research with us on Greenland Sharks. This species was not on our requested list. *We ask for guidance on what would be required at this stage to add the Greenland Shark to our list of authorized research species.*

Would it be possible to provide clarification on these questions? Global Affairs has requested that a response be provided by the end of the week.

Thank you, and best wishes,

Andrew

**MacDonald, Jennifer**

---

**From:** Humphrey, Donald  
**Sent:** July-31-18 9:12 AM  
**To:** Webster, Corey J  
**Subject:** RE: SARA permits - information tracking and enforcement request

Ok, thanks Corey. I will follow-up with Mike.

I assume Shari is back now as well?

Donald

---

**From:** Webster, Corey J  
**Sent:** July-31-18 8:19 AM  
**To:** Humphrey, Donald  
**Cc:** Cherry, Michael  
**Subject:** RE: SARA permits - information tracking and enforcement request

Donald,

I was given direction by my director Mike Cherry that C&P would be unable to participate in activities like the one mentioned. If you would like to discuss his decision in more detail, [REDACTED]

Thanks for your understanding,

**Corey Webster**

Ecosystems Program Coordinator  
Maritimes Region, Conservation & Protection, DFO  
Région des Maritimes, Conservation et Protection, MPO  
16 Endeavour Dr./ 16 prom. Endeavour  
PO Box 1006 / C.P. 1006  
Dartmouth, NS / N-É B2Y 4A2  
Tel: (902) 407-7071 | Cell : [REDACTED]  
Government of Canada | Gouvernement du Canada |  
E-Mail / Courrier électronique: [corey.webster@dfo-mpo.gc.ca](mailto:corey.webster@dfo-mpo.gc.ca)



**From:** Humphrey, Donald  
**Sent:** Tuesday, July 31, 2018 8:09 AM  
**To:** Webster, Corey J <[Corey.Webster@dfo-mpo.gc.ca](mailto:Corey.Webster@dfo-mpo.gc.ca)>  
**Subject:** RE: SARA permits - information tracking and enforcement request

Hi Corey, I was hoping you could provide clarity as to why C&P is unable to provide support for one or more days to monitor compliance with conditions of a SAR permit?

Thanks, Donald

Regional Manager, Species at Risk, Maritimes Region  
Fisheries and Oceans Canada/Government of Canada  
[Donald.Humphrey@dfo-mpo.gc.ca](mailto:Donald.Humphrey@dfo-mpo.gc.ca)/Tel: 902-222-3877

Gestionnaire régionale, Espèces en Péril, Région des Maritimes  
Pêches et Océans Canada/Gouvernement du Canada  
[Donald.Humphrey@dfo-mpo.gc.ca](mailto:Donald.Humphrey@dfo-mpo.gc.ca)/Tél.: 902-222-3877

---

**From:** MacDonald, Jennifer  
**Sent:** July-30-18 3:07 PM  
**To:** Humphrey, Donald  
**Subject:** FW: SARA permits - information tracking and enforcement request

Hi Donald,

As noted below, I have discussed the possibility of C&P doing some amount of enforcement / observing the activities of OCEARCH; Corey Webster has indicated that this is not a possibility at this time – when we spoke, he indicated that given workload, they would be limited to undertaking activities within their core mandate and this may not fall within that.

I don't have OCEARCH's exact research dates, but I understand that they are scheduled to arrive in NS in early September.

Thanks,

Jenn

**Jennifer MacDonald**  
Species at Risk Management Division  
(902) 407-8175

---

**From:** Webster, Corey J  
**Sent:** July-20-18 2:10 PM  
**To:** MacDonald, Jennifer  
**Subject:** RE: SARA permits - information tracking and enforcement request

Jennifer,

Just wanted to follow-up. I wanted to confirm that C&P will not be able to help monitor the OCEARCH group.

Thanks

**Corey Webster**  
*A/Chief, Program and Operational Readiness / Chef, Préparation aux programmes et opérations*  
Maritimes Region, Conservation & Protection, DFO  
Région des Maritimes, Conservation et Protection, MPO  
16 Endeavour Dr./ 16 prom. Endeavour  
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Dartmouth, NS / N-É B2Y 4A2  
**Tel:** (902) 407-7071 | **Cell :** [REDACTED]  
Government of Canada | Gouvernement du Canada |  
**E-Mail / Courrier électronique:** [corey.webster@dfo-mpo.gc.ca](mailto:corey.webster@dfo-mpo.gc.ca)

**From:** MacDonald, Jennifer  
**Sent:** Tuesday, July 17, 2018 4:25 PM  
**To:** Webster, Corey J <Corey.Webster@dfo-mpo.gc.ca>  
**Subject:** SARA permits - information tracking and enforcement request

Hi Corey,

I work within the Species at Risk group and am responsible for the review of permits for research/scientific activities under SARA. I wanted to touch base with you about a couple of questions (I was actually in the middle of writing this message, when Jeanette's request to share permitting information with you regarding NEAq popped up, so my first question to you may be particularly relevant).

First, I have been sending our SARA permits to Scott Mossman as we issue them, so that C&P has copies of the permits, as well as a list of all currently valid SARA permits; I was just recently given your name as the SARA contact – should I be sending the SARA permits to you now? If so, would you like me to forward to you the most recent permits/summary table that I sent to Scott?

Second, we issued a SARA permit to the American shark research group OCEARCH, to carry out some tagging activities in Canadian waters this coming September/October. As they are catching the sharks in order to tag them, they also require a s.52 Licence/Foreign Vessel Licence. That licencing is in progress, although likely to be approved shortly. As part of the SARA permit, a condition was included that a DFO representative accompany the research team for a portion of their activities (they are planning to be stationed in Mahone Bay initially and it sounds like they will be making day trips out into the bay for tagging). I was hoping I could discuss with you whether it would be possible for C&P to accompany the researchers at some point in support of fulfilling this condition of the SARA permit. I apologize as we should have discussed this with you in advance of issuing the permit; however, if there is still an opportunity to discuss this and fit this into C&P's workplan, that would be appreciated. As an aside, I was at a meeting last week regarding OCEARCH's Foreign Vessel Licence; Scott Mossman was in attendance and [REDACTED] did suggest that C&P may want to be present in Mahone Bay during some of the research.

If it would be easier to discuss by phone, please don't hesitate to give me a call. I can also send you a copy of the SARA Permit issued to OCEARCH if you don't have access to a copy.

Thanks so much,  
 Jenn

**Jennifer MacDonald**

Species at Risk Biologist | Biologiste des espèces en péril  
 Species at Risk Management Division | Division de la gestion des espèces en péril  
 Ecosystem Management | Gestion des écosystèmes  
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 Tel | Tél: (902) 407-8175 Fax | Téléc: (902) 426-2331  
 Email | Courriel: [jennifer.macdonald@dfo-mpo.gc.ca](mailto:jennifer.macdonald@dfo-mpo.gc.ca)

**Regional or Local Number:** NLSAR-001-18 (PATH: 17-PNFL-00020)  
DFO-MAR-2017-17 (PATH: 17-PMAR-00018)

**Explanation for:** SARA Permit

Notice is hereby given that pursuant to the provisions of section 73 of the *Species at Risk Act* permits No. NLSAR-001-18, and No. DFO-MAR-2017-17 are issued.

**Start or Issue Date:** 2018-08-01

**End or Expiry Date:** 2018-11-30

**Purpose:**

The activity is scientific research relating to the conservation of the species and conducted by qualified persons.

**English Description of Activity**

The purpose of the activity is to conduct scientific research on White Sharks in Canadian waters to gain a better understanding of the role of Canadian waters in the life history of the White Shark population in the northwest Atlantic Ocean, the range of the species within Canadian waters and health of White Sharks. The researchers will attach acoustic and satellite tags, as well as collect various biological samples, from up to 20 sharks in Canadian waters.

Researchers will use chum to attract White Sharks in the study area to the fishing boat and larger research vessel. When a White Shark is sighted, either visually or using a drone, the fishing boat will target its fishing activities to attract and capture that shark. Chum bags, chum boxes, bait tanks, chum tubes and decoys may all be used to attract White Sharks to the fishing vessel. Once a White Shark is in the vicinity of the fishing vessel, the researchers will attempt to catch the shark using a 20/0 circle hook (zero offset) with a bite-blocker attached. In the case of a very large White Shark, a 27/0 circle hook (zero offset) with a buoy to prevent swallowing of the hook will be used. Once caught, the White Shark will be guided onboard the hydraulic lift on the research vessel, which will then be raised above the waterline. While on the lift, sharks will be provided with oxygenated seawater via a mouthpiece and tube.

Once on the lift, internal acoustic tags will be implanted surgically in the coelomic cavity and the incision will be sutured. Smart Position and Temperature (SPOT) tags will be attached on the leading edge of the first dorsal fin by drilling four holes in the dorsal fin with an electric drill and attaching the tag with nylon bolts, stainless steel locknuts and plastic spacers. The hardware is designed to retain the tag for five years after which it will fail and the tag will detach. All White Sharks caught, up to 20, will have both acoustic and SPOT tags applied. Pop-up Archival Satellite Tags (PSAT) will be attached via a tether to a subdermal metal dart implanted in the shark's flank below the first dorsal fin. PSAT tags will be attached to up to 6 White Sharks caught.

The researchers will also collect samples (blood, muscle, semen, fecal and urine samples), conduct skin, gill and cloacal swabs, collect parasites, collect eye and tail measurements, and perform an ultrasound (females). Samples will be collected using a hypodermic puncture and

s.21(1)(b)

biopsy punch.

The activities authorized by the permits include:

- Actively attracting White Sharks to a vessel;
- Catch and release of White Sharks
- Lifting individuals out of the water on a hydraulic lift;
- Collecting blood and tissue samples;
- Implanting internal acoustic tags; and
- Attaching SPOT and PSAT tags.

#### French Description of Activity

<French Translations is required for the information presented in the previous section.>

#### Issuing Authority

Fisheries and Oceans Canada NL Region and Maritimes Region

#### Authority Used

*Species at Risk Act*

#### English Pre-Conditions:

##### a) Alternatives

The proposed activities aim to answer a number of research questions, both through the tracking of individual White Sharks that will be tagged and through analysis on blood and other tissue samples. Scientific research to better understand White Shark population dynamics, distribution and habitat use and to collect and maintain White Shark sightings information are high priority areas for research. This planned research project is consistent with the research and management approaches included in the draft recovery strategy for this species.

In relation to the proposed activities, overall the applicant asserts that the methods and procedures proposed are the safest and most successful way of obtaining the necessary samples and attaching SPOT tags. Alternative to catching, retaining and lifting White Sharks out of the water include (1) attracting a shark and sampling and/or tagging it without restraining or catching it or (2) attracting a shark and catching it, but conducting the sampling and/or tagging while the shark remains in the water. Under alternative (1), the success rate for tagging and collecting samples would likely be less than using one of the alternative methodologies. Under alternative (2), the applicant has indicated that sharks are more likely to struggle if they remain in the water, while being on the lift quiets the animals and therefore the proposed method reduces the potential for harm to the sharks. Sampling and tagging using an alongside-boat method requires calm sea conditions, and may also increase the risk to researchers.

With respect to the precise methodology proposed to capture sharks, the approaches proposed likely present the best alternative to reduce potential impacts. Alternatives would be to use a 'J' hook instead of a circle hook, to not use the bite blocker, to not embed the leaders in rope. However, all of these alternatives would increase the risk of internal (e.g., gut-hooking) or external (e.g., lacerations) injury to the sharks.

An alternative method to collecting biological samples, would be to collect samples by harpoon, while the shark remains in the water. However, the collection of blood samples, swabs of the skin mucus, gill surface and cloacal, parasite collection and semen samples require catching and controlling the animal. Further, attempting to obtain samples in the water increases the risk of sample contamination, loss of sample and infections in the shark. Muscle samples are taken from the site of the PSAT tag attachment reducing sample wounds on the shark.

SPOT, PSAT and acoustic tags all collect different types of data. To obtain real-time geolocation data from an animal that is wide ranging within areas that are previously unknown, SPOT tags provide the best option for collecting this data. The applicants has indicated that to understand an animal's large scale movements and migration, SPOT tags are the most effective in revealing the precise tracks and this data, cannot be substituted with data from PSAT or acoustic tags. Further, the real time data from SPOT tags support their educational and outreach objectives.

Acoustic tags can be attached externally rather than internally. While some researchers have successfully utilized externally attached acoustic tags, the applicant has indicated that there are concerns with the risk that external tags can be shed. In addition, internal tags have been shown to transmit for up to 5 years (and even up to 10 years), while external tags have a shorter lifespan of approximately 1 year. The internal tags do not cause on-going harm to sharks once implanted.

SPOT tags can also be attached as floating tags, however floating SPOT tags can be fouled, shed and lost from the animal very rapidly. There is a new technique available to attach SPOT tags with a single bolt, rather than the four bolt attachment methodology proposed by this applicant; however the applicant has indicated that the single bolt attachment has a shorter lifespan, limiting the data that can be collected. Additionally, the single bolt attachment requires a saddle in which the tag is placed when attached; this saddle may decrease hydrodynamics for the sharks on an on-going basis.



s.21(1)(b)

The proposed activities are the best means to gather the anticipated information and data. The likelihood of mortality will be low.

#### b) Measures to minimize impact

Research personnel are experienced in the study, capture and recovery of White Sharks using the methods planned for this research program. The following measures will be implemented to minimize impacts of planned research activities:

- Individuals will not be chased by the vessel, but will be attracted using chum;
- Gear will be used that will minimize the chance that animals are gut-hooked (including using circle hooks and a crossbar bite-blocker);
- Animal struggles and injury will be minimized by:
  - using a leader attached to a braid rope with elasticity properties to help reduce hard shock during the initial struggle;
  - using a 10 m leader length in case the shark rolls in the line to ensure that the shark cannot bite through the rope and escape (retaining the hook and leader);
  - embedding the leader inside a three-strand rope to give it a thicker diameter so that if the shark rolls, the thicker rope does not cut into the sharks' skin and is easier to unwrap;
  - using heavier tackle that keeps enough pressure on the shark so that the line is stretched tight and the shark cannot turn and roll.
- All research procedures will be conducted within 20 minutes of the White Shark being placed on the research platform;
- While on the research platform:
  - oxygenated seawater will be pumped through a hose and mouthpiece (allowing for simultaneous flushing of the gills on both sides of the head) into the shark's buccal cavity at all times;
  - a tail rope will be used to prevent the animal from causing harm to itself and others;
  - the head and eyes will be covered with wet terrycloth towel to reduce stress and keep eyes moist;
  - skin will be kept wet during in-air procedures to prevent drying;
  - animal stress will be monitored by observing skin colouration, presence of blood pooling, gill movements, and animal activity;
  - if stress is detected in the animal, a blood sample will be taken to evaluate the shark's conditions;
  - if acute stress is observed, the animal will be released immediately.

#### c) Effects on survival and recovery

The proposed activities will not jeopardize survival or recovery of the listed species due to low risk of long term or permanent injury or death and will not impact on the species' habitats or

**Commented [DFO2]:** There were a few additional conditions included in the permit; if the section on all conditions is included below, then I think that's fine. We don't seem to usually include that section, so if we removed it, then we should probably capture those items here (max time, number of sharks that can be caught,, min size)

prey. No mortality is expected. As such it is unlikely that White Shark recovery will be compromised.

**French Pre-Conditions:**

**a) Solutions de rechange**

<French Translation is required for Section a above>

**b) Mesures visant à réduire au minimum les impacts**

<French Translation is required for Section b above>

**c) Effets sur la survie ou le rétablissement de l'espèce**

<French Translation is required for Section c above>

**English Terms and Conditions**

The activities must be carried out in accordance with the following conditions:

**General Conditions:**

**Terms and Conditions of Permit**

The activity must be carried on in accordance with the following conditions:

**1. General Conditions**

- 1.1. A copy of this permit shall be kept on site at all times in the possession of the Permit Holder or a person acting under the Permit Holder's authority, and shall be made available to an enforcement officer upon request.
- 1.2. All persons undertaking the activity under the authority of the Permit Holder shall do so under the direction and oversight of the Permit Holder and shall be made familiar with the conditions of this permit.
- 1.3. The activity must comply with the conditions identified within this permit. Activities that affect individuals of species at risk, their residences, or their critical habitat, other than those specifically identified within this permit are not authorized under this permit.
- 1.4. No changes to the Permitted activities shall take place without prior consultation with DFO, and written approval from DFO, Species at Risk Management Division. Contact information as follows:

Species at Risk Management Division  
Fisheries and Oceans Canada  
80 East White Hills Road  
PO Box 5667  
St. John's, NL, A1C 5X1  
email: [SARANL-LEPTNL@dfo-mpo.gc.ca](mailto:SARANL-LEPTNL@dfo-mpo.gc.ca)  
phone: 1-709-772-2443 fax: 1-709-772-5562

**2. Conditions to avoid or minimize the impact of the activity on the species:**

- 2.1. To the extent possible, activities shall be conducted in a manner whereby any individuals of the species shall be handled only in the circumstances authorized under this permit and with the least amount of harm.
- 2.2. Activities shall only be conducted in the study area described above. If activities are to be conducted outside the study area, DFO shall be notified in advance using the contact information in condition 1.4.
- 2.3. Only individuals that are experienced in tagging large pelagic fishes shall tag White Sharks.
- 2.4. White Sharks shall not be chased by the vessel.
- 2.5. The following gear shall be used: circle hooks (either 20/0 or 27/0 with zero offset) rigged with a cross bar bit-blocker (30cm up the leader) and attached to a stainless steel wire rope (3/32" or 1/8"). The leader shall be 10m in length and shall be attached to a braid rope with elasticity properties. Leaders shall be embedded inside a three-strand rope to increase the diameter.
- 2.6. Individual White Sharks shall not be kept on the research platform for longer than 20 minutes.
- 2.7. While on the research platform, oxygenated seawater shall be pumped through a hose and mouthpiece into the shark's buccal cavity at all times.
- 2.8. While on the research platform, a tail rope shall be used to prevent the animal from causing harm to itself and others.
- 2.9. While on the research platform, the animal's head and eyes shall be covered with wet towel to reduce animal stress and keep eyes moist.
- 2.10. While on the research platform, the animal's skin shall be kept wet.
- 2.11. While on the research platform animal stress shall be monitored by observing skin colouration, presence of blood pooling, gill movements, and animal activity. If acute stress is observed, the animal shall be released immediately.
- 2.12. The total time of engagement with a single White Shark from the time it is initially hooked until it is released shall be limited to 40 minutes.
- 2.13. No more than 20 White Sharks, in total, shall be tagged.
- 2.14. No attempts shall be made to tag White Sharks that are injured or behaving abnormally.
- 2.15. Only White Sharks greater than 3.5 metres in total length shall be caught and tagged.
- 2.16. A DFO representative shall be onboard as an observer during a subset of the expedition to be determined by DFO.
- 2.17. In the event of a mortality or significant injury being sustained by a White Shark during a tagging attempt, all further attempts at tagging shall cease and DFO shall be contacted immediately using the contact information in condition 1.4. No further attempts at catching or tagging White Sharks shall be resumed until approved by DFO.

**3. Conditions that relate to monitoring and reporting:**

- 3.1. By December 31, 2018, irrespective of whether the Permitted activities took place, a SARA Section 73 Permit Report shall be completed and returned to the Species at Risk Management Division using the contact information provided in condition 1.4. Without limiting the generality of the foregoing, the report shall contain the following information, to the satisfaction of DFO in its sole discretion:
    - 3.1.1. to demonstrate that measures and standards to avoid and mitigate the impacts of the permitted activities on the species were implemented according to the conditions of this permit;
    - 3.1.2. an assessment of whether the measures and standards mentioned in condition 3.1.1 were
-

- successful at avoiding and mitigating the impacts of the permitted activities on the species;
- 3.1.3. details of any contingency measures that were followed to prevent impacts greater than those authorized by this permit;
- 3.1.4. for any interaction with, or sighting of, a White Shark, report the following: date, time, location, length, size, gender (specify if females are pregnant or not), condition of the individual; and identify if tagging was attempted or undertaken on that individual; and
- 3.1.5. provide details of any tagging attempts, including whether tagging was successful, unplanned or unexpected impacts on the shark, reaction of the shark to the tagging, and lessons learned.
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**French Terms and Conditions** (optional)

L'activité doit être exercée conformément aux conditions suivantes:

**Conditions générales:**

<French Translation of information provided above in the section titled "General Conditions" is required here>

**Conditions à respecter pour éviter ou minimiser les conséquences négatives des activités sur l'espèce:**

<French Translation of information provided above in the section titled "Conditions to avoid or minimize the impact of the activities on the species" is required here>

**Conditions relatives à la surveillance et à la production de rapports:**

<French Translation of information provided above in the section titled "Conditions that relate to monitoring and reporting" is required here>

**English Other Relevant Information** (optional)

**French Other Relevant Information** (optional)

**Locations of Activity:**

*Newfoundland and Labrador:*

- *South Coast - Placentia Bay (47° 05.00' N / 54° 32.00' W)*

*Nova Scotia:*

- *Mahone Bay (44° 29.50' N / 64° 13.50' W and adjacent areas*
- *Bay of Fundy (44° 54.00' N / 66° 32.50' W and adjacent areas; and*
- *Sable Island (43° 56.14' N / 59° 56.59' W)*

**Affected Species**

Common Name	Scientific name/Nom scientifique
White shark (Atlantic population)	<i>Carcharodon carcharias</i>

**Contact Information**

Species at Risk Program  
Fisheries and Oceans Canada – NL Region  
PO Box 5667 St. John's NL A1C 5X1  
Telephone: 709-772-2443  
Fax: 709-772-5562  
[SARANL-LEPTNL@dfo-mpo.gc.ca](mailto:SARANL-LEPTNL@dfo-mpo.gc.ca)

Species at Risk Management Division  
Fisheries and Oceans Canada – Maritimes Region  
P. O. Box 1006 Dartmouth NS B2Y 4A2  
Telephone: 1-866-891-0771  
Fax: 902-426-2331  
[SpeciesatRisk.xmar@dfo-mpo.gc.ca](mailto:SpeciesatRisk.xmar@dfo-mpo.gc.ca)

## MacDonald, Jennifer

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**From:** Robert Hueter <[rhueter@mote.org](mailto:rhueter@mote.org)>  
**Sent:** August-16-18 10:40 AM  
**To:** MacDonald, Jennifer; Chris Fischer  
**Cc:** Fernanda Ubatuba; Ami Meite  
**Subject:** Re: SARA Permit

Thanks for that clarification, Jenn, and yes, the work is totally being undertaken under my direction and supervision as the Expedition Chief Scientist.

We're organizing the science team schedule now and you'll be receiving some communications from us about opportunities for you to come onboard.

Cheers,  
Bob

**ROBERT E. HUETER, Ph.D.**

*Senior Scientist & Director, Center for Shark Research  
Perry W. Gilbert Chair in Shark Research  
Manager, Sharks & Rays Conservation Research Program  
Mote Marine Laboratory  
1600 Ken Thompson Parkway  
Sarasota, FL 34236 USA*

[rhueter@mote.org](mailto:rhueter@mote.org)  
Tel: 941-388-1827  
Fax: 941-388-4312  
More info at: [www.mote.org](http://www.mote.org)

On 8/16/2018 8:40 AM, MacDonald, Jennifer wrote:

Hi Bob,  
As you are named as the primary permit holder, we would expect that the work is being undertaken under your direction. That being said, it does not mean that you must be on board at all times, as long as you are advising on how the work is carried out.  
Thanks,  
Jenn

**Jennifer MacDonald**  
Species at Risk Management Division  
(902) 407-8175

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**From:** Robert Hueter [<mailto:rhueter@mote.org>]  
**Sent:** August-15-18 2:57 PM

**To:** MacDonald, Jennifer; Chris Fischer  
**Subject:** Re: SARA Permit

I will be onboard beginning Sept 18 and have tentatively planned to stay the entire time, but would like the flexibility to leave mid-expedition if something comes up. We have a full science team with team leaders onboard at all times, in addition to Chris and his crew. Let me know about this please.

**ROBERT E. HUETER, Ph.D.**

*Senior Scientist & Director, Center for Shark Research  
Perry W. Gilbert Chair in Shark Research  
Manager, Sharks & Rays Conservation Research Program  
Mote Marine Laboratory  
1600 Ken Thompson Parkway  
Sarasota, FL 34236 USA*

[rhuetter@mote.org](mailto:rhuetter@mote.org)

Tel: 941-388-1827

Fax: 941-388-4312

More info at: [www.mote.org](http://www.mote.org)

On 8/15/2018 1:54 PM, MacDonald, Jennifer wrote:

Hi Bob,

The permit indicates that the activities are carried out under your supervision/direction.

Will you be on the ship for the length of the expedition?

Thanks,

Jenn

**Jennifer MacDonald**

Species at Risk Management Division  
(902) 407-8175

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**From:** Robert Hueter [<mailto:rhuetter@mote.org>]

**Sent:** August-15-18 12:26 PM

**To:** MacDonald, Jennifer; Chris Fischer

**Subject:** Re: SARA Permit

Thanks Jenn. While we're on this subject, let me confirm with you that as long as either Chris or I are on the ship when the research is being conducted, we're good to go under this permit, correct?

It's looking like we'll most likely not be going to Newfoundland but spending our time in Nova Scotia with hopes of going to Sable in the middle of the expedition, during a good weather window. Beating the bushes for marine mammal material in NS now.

Cheers,

Bob

**ROBERT E. HUETER, Ph.D.**

*Senior Scientist & Director, Center for Shark Research  
Perry W. Gilbert Chair in Shark Research  
Manager, Sharks & Rays Conservation Research Program  
Mote Marine Laboratory*

1600 Ken Thompson Parkway  
Sarasota, FL 34236 USA

[rhuetter@mote.org](mailto:rhuetter@mote.org)  
Tel: 941-388-1827  
Fax: 941-388-4312  
More info at: [www.mote.org](http://www.mote.org)

On 8/15/2018 10:43 AM, MacDonald, Jennifer wrote:

Hello Bob and Chris,

I just noticed that there was a typo on the first page of your SARA permit, so I have fixed it and have attached the correct version for you. Please note that nothing in any of the conditions changed, it was simply to fix an error in the line about who the permit holder was (it had inadvertently indicated DFO here, rather than OCEARCH).

Thanks!  
Jenn

**Jennifer MacDonald**

Species at Risk Biologist | Biologiste des espèces en péril  
Species at Risk Management Division | Division de la gestion des  
espèces en péril  
Ecosystem Management | Gestion des écosystèmes  
Fisheries & Oceans Canada | Pêches & Océans Canada  
P.O. Box 1006 Dartmouth N.S. | C.P. 1006 Dartmouth N.E. B2Y 4A2  
Tel | Tél: (902) 407-8175 Fax | Téléc: (902) 426-2331  
Email | Courriel: [jennifer.macdonald@dfo-mpo.gc.ca](mailto:jennifer.macdonald@dfo-mpo.gc.ca)





Fisheries and Oceans Canada  
Pêches et Océans Canada

SARA Permit No: DFO-MAR-2017-17

## PERMIT ISSUED UNDER SECTION 73 OF THE SPECIES AT RISK ACT

Subject to the conditions described in this permit, the holder of this permit ("Permit Holder"), or any qualified person acting under the authority of the Permit Holder, is authorized under the authority of subsection 73(1) of the *Species at Risk Act*, S.C. 2002, c.29 (SARA) to engage in activities (as described in this permit) that **harm, harass, capture, and possess** individuals of the following threatened or endangered aquatic species listed on Schedule 1 of SARA:

**White Shark** (*Carcharodon carcharias*), Atlantic population

### Permit issued to:

Name: OCEARCH ("Permit Holder")  
 Attention to: George Christopher Fischer  
 Address: 1790 Bonanza Drive, Suite 101B  
 Park City, Utah, USA 84060  
 Email: [chris@oceanarch.org](mailto:chris@oceanarch.org)  
 Phone: (435) 645-8990 (office) [REDACTED] (cellular)

The following individual operating under the authority of OCEARCH as "Permit Holder", and those under his supervision, may undertake the activities authorized by this permit:

Name	Organization
Robert Hueter	Mote Marine Laboratory

### Location of Proposed Activity

**This permit is only valid at the following location(s):**

Nearest community (city, town, village): N/A

Municipality, district, township, county: N/A

Province: N/A

Name of watercourse(s), waterbody(ies): **Atlantic Ocean**

Specific location: Mahone Bay, Bay of Fundy and the area around Sable Island

### Valid Permit Period

This permit is valid from **August 1, 2018** until **November 30, 2018**

If the Permit Holder cannot complete the activity during this period, Fisheries and Oceans Canada (DFO) must be notified in advance of the expiration of the time period, as soon as the Permit Holder is aware.

The period during which other conditions of this permit must be complied with are provided in their respective sections below. DFO may, where appropriate, amend this permit. In cases where the Valid Permit Period is extended, written notice and/or an amended permit will be provided to the Permit Holder.

Canada

.../2

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### Description of the Activity

The purpose of the activity is to conduct scientific research on White Sharks in Canadian waters to gain a better understanding of the role of Canadian waters in the life history of the White Shark population in the northwest Atlantic Ocean, the range of the species within Canadian waters and health of White Sharks. The researchers will attach acoustic and satellite tags, as well as collect various biological samples, from up to 20 sharks in Canadian waters.

The study area includes:

- Mahone Bay;
- Bay of Fundy; and
- Scotian Shelf.

Researchers will use chum to attract White Sharks in the study area to the fishing boat and larger research vessel. When a White Shark is sighted, either visually or using a drone, the fishing boat will target its fishing activities to attract and capture that shark. Chum bags, chum boxes, bait tanks, chum tubes and decoys may all be used to attract White Sharks to the fishing vessel. Once a White Shark is in the vicinity of the fishing vessel, the researchers will attempt to catch the shark using a 20/0 circle hook (zero offset) with a bite-blocker attached. In the case of a very large White Shark, a 27/0 circle hook (zero offset) with a buoy to prevent swallowing of the hook will be used. Once caught, the White Shark will be guided onboard the hydraulic lift on the research vessel, which will then be raised above the waterline. While on the lift, sharks will be provided with oxygenated seawater via a mouthpiece and tube.

Once on the lift, internal acoustic tags will be implanted surgically in the coelomic cavity and the incision will be sutured. Smart Position and Temperature (SPOT) tags will be attached on the leading edge of the first dorsal fin by drilling four holes in the dorsal fin with an electric drill and attaching the tag with nylon bolts, stainless steel locknuts and plastic spacers. The hardware is designed to retain the tag for five years after which it will fall and the tag will detach. All White Sharks caught, up to 20, will have both acoustic and SPOT tags applied. Pop-up Archival Satellite Tags (PSAT) will be attached via a tether to a subdermal metal dart implanted in the shark's flank below the first dorsal fin. PSAT tags will be attached to up to 6 White Sharks caught.

The researchers will also collect samples (blood, muscle, semen, fecal and urine samples), conduct skin, gill and cloacal swabs, collect parasites, collect eye and tail measurements, and perform an ultrasound (females). Samples will be collected using a hypodermic puncture and biopsy punch.

The activities authorized by this permit consist of:

- Actively attracting White Sharks to a vessel;
- Catch and release of White Sharks;
- Lifting individuals out of the water on a hydraulic lift;
- Collecting blood and tissue samples;
- Implanting internal acoustic tags; and
- Attaching SPOT and PSAT tags.

The effects that the activity may cause to the listed wildlife species and the effects of those changes authorized by this permit are as follows:

- Harm, harassment, capture and possession of listed aquatic species at risk.

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## **Terms and Conditions of Permit**

The activity must be carried on in accordance with the following conditions:

### **1. General Conditions**

- 1.1. A copy of this permit shall be kept on site at all times in the possession of the Permit Holder or a person acting under the Permit Holder's authority, and shall be made available to an enforcement officer upon request.
- 1.2. All persons undertaking the activity under the authority of the Permit Holder shall do so under the direction and oversight of the Permit Holder and shall be made familiar with the conditions of this permit.
- 1.3. The activity must comply with the conditions identified within this permit. Activities that affect individuals of species at risk, their residences, or their critical habitat, other than those specifically identified within this permit are not authorized under this permit.
- 1.4. No changes to the Permitted activities shall take place without prior consultation with DFO, and written approval from DFO, Species at Risk Management Division. Contact information as follows:

Species at Risk Management Division  
Fisheries and Oceans Canada  
P.O. Box 1006  
Dartmouth, NS, B2Y 4A2  
email: [SpeciesatRisk.xmar@dfo-mpo.gc.ca](mailto:SpeciesatRisk.xmar@dfo-mpo.gc.ca)  
phone: 1-866-891-0771 fax: 1-902-426-2331

### **2. Conditions to avoid or minimize the impact of the activity on the species:**

- 2.1. To the extent possible, activities shall be conducted in a manner whereby any individuals of the species shall be handled only in the circumstances authorized under this permit and with the least amount of harm.
- 2.2. Activities shall only be conducted in the study area described above. If activities are to be conducted outside the study area, DFO shall be notified in advance using the contact information in condition 1.4.
- 2.3. Only individuals that are experienced in tagging large pelagic fishes shall tag White Sharks.
- 2.4. White Sharks shall not be chased by the vessel.
- 2.5. The following gear shall be used: circle hooks (either 20/0 or 27/0 with zero offset) rigged with a cross bar bit-blocker (30cm up the leader) and attached to a stainless steel wire rope (3/32" or 1/8"). The leader shall be 10m in length and shall be attached to a braid rope with elasticity properties. Leaders shall be embedded inside a three-strand rope to increase the diameter.
- 2.6. Individual White Sharks shall not be kept on the research platform for longer than 20 minutes.
- 2.7. While on the research platform, oxygenated seawater shall be pumped through a hose and mouthpiece into the shark's buccal cavity at all times.
- 2.8. While on the research platform, a tail rope shall be used to prevent the animal from causing harm to itself and others.
- 2.9. While on the research platform, the animal's head and eyes shall be covered with wet towel to reduce animal stress and keep eyes moist.
- 2.10. While on the research platform, the animal's skin shall be kept wet.
- 2.11. While on the research platform animal stress shall be monitored by observing skin colouration, presence of blood pooling, gill movements, and animal activity. If acute stress is observed, the animal shall be released immediately.
- 2.12. The total time of engagement with a single White Shark from the time it is initially hooked until it is released shall be limited to 40 minutes.
- 2.13. No more than 20 White Sharks, in total, shall be tagged.
- 2.14. No attempts shall be made to tag White Sharks that are injured or behaving abnormally.
- 2.15. Only White Sharks greater than 3.5 metres in total length shall be caught and tagged.
- 2.16. A DFO representative shall be onboard as an observer during a subset of the expedition to be

determined by DFO.

- 2.17. In the event of a mortality or significant injury being sustained by a White Shark during a tagging attempt, all further attempts at tagging shall cease and DFO shall be contacted immediately using the contact information in condition 1.4. No further attempts at catching or tagging White Sharks shall be resumed until approved by DFO.

**3. Conditions that relate to monitoring and reporting:**

- 3.1. By December 31st, 2018, irrespective of whether the Permitted activities took place, a SARA Section 73 Permit Report shall be completed and returned to the Species at Risk Management Division using the contact information provided in condition 1.4. Without limiting the generality of the foregoing, the report shall contain the following information, to the satisfaction of DFO in its sole discretion:
- 3.1.1. to demonstrate that measures and standards to avoid and mitigate the impacts of the permitted activities on the species were implemented according to the conditions of this permit;
  - 3.1.2. an assessment of whether the measures and standards mentioned in condition 3.1.1 were successful at avoiding and mitigating the impacts of the permitted activities on the species;
  - 3.1.3. details of any contingency measures that were followed to prevent impacts greater than those authorized by this permit;
  - 3.1.4. for any interaction with, or sighting of, a White Shark, report the following: date, time, location, length, size, gender (specify if females are pregnant or not), condition of the individual; and identify if tagging was attempted or undertaken on that individual; and
  - 3.1.5. provide details of any tagging attempts, including whether tagging was successful, unplanned or unexpected impacts on the shark, reaction of the shark to the tagging, and lessons learned.

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**Authorization Limitations and Application Conditions**

This permit cannot be transferred or assigned to another party. If the activity authorized under this permit is sold or transferred to another party, or if other circumstances arise that result in another party taking over the activity, the Permit Holder shall advise DFO in advance if the ownership or responsibility for the activity is expected to change.

The failure to comply with any condition of this permit is an offence under section 97 of SARA and might result in charges being laid under SARA.

This permit may be revoked or amended to ensure the survival or recovery of White Shark. Without limiting the generality of the foregoing, DFO may:

- suspend any permitted activities to avoid or mitigate additional adverse direct or indirect effects to White Sharks;
- amend or revoke this permit; and
- direct the Permit Holder to carry out at the Permit Holder's expense any modifications or actions deemed necessary by DFO to avoid or mitigate existing impacts or to avoid further adverse direct and indirect impacts to White Sharks.

This permit is valid only with activities and species listed herein and for no other purposes. It does not authorize the Permit Holder to kill, buy, sell, or trade an individual of a wildlife species that is listed as extirpated, endangered or threatened, or any part or derivative of such an individual. This permit does not purport to release the Permit Holder from any obligation to obtain permission from or to comply with the requirements of any other regulatory agencies.

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Date of Issue: **APR 30 2010**

Signature of authorizing officer: 

Donald Humphrey  
Manager, Species at Risk Management Division  
Maritimes Region  
Fisheries and Oceans Canada  
1 Challenger Drive, P.O. Box 1006, Dartmouth, NS, B2Y 4A2

Further information about this permit is available from the above authorizing officer ([Donald.Humphrey@dfo-mpo.gc.ca](mailto:Donald.Humphrey@dfo-mpo.gc.ca)).

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**MacDonald, Jennifer**

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**From:** Robert Hueter <[rhueter@mote.org](mailto:rhueter@mote.org)>  
**Sent:** August-17-18 3:09 PM  
**To:** Tonya Wimmer  
**Cc:** MacDonald, Jennifer; Chris Fischer; Jarrett Corke  
**Subject:** Re: Question about seals

Thanks Tonya, the DFO people are out of the office for a while so we'll need to wait on their return to get an answer about the SARA permit. But let's proceed with a backup plan to use seal since you get those more often. Again, whale is much more desirable and as Chris said condition does not matter.

Have a great weekend...

Bob

**ROBERT E. HUETER, Ph.D.**

*Senior Scientist & Director, Center for Shark Research  
Perry W. Gilbert Chair in Shark Research  
Manager, Sharks & Rays Conservation Research Program  
Mote Marine Laboratory  
1600 Ken Thompson Parkway  
Sarasota, FL 34236 USA*

[rhueter@mote.org](mailto:rhueter@mote.org)  
Tel: 941-388-1827  
Fax: 941-388-4312  
More info at: [www.mote.org](http://www.mote.org)

On 8/17/2018 1:53 PM, Tonya Wimmer wrote:

Hi Bob,

Like minkes and humpbacks, seals are not SARA-listed and thus, provision of material is quite straight-forward as long as DFO approves seal meat to be able to be used from the white shark perspective (which is a SARA species).

Re obtaining the material, again, it depends on an incident occurring of a dead seal. This does tend to happen more often than large whales, so I don't anticipate a problem there (too bad we didn't know sooner as several seal necropsies were completed within the last few weeks but the blubber is not retained as there are no facilities to hold it). However, sadly, we do tend to get quite a few seals.

Question regarding the whale blubber, does it matter if the whale has been dead for some time (ie a condition 4+ carcass, severely decomposed)?

Cheers  
Tonya

On Fri, Aug 17, 2018 at 2:41 PM, Robert Hueter <[rhueter@mote.org](mailto:rhueter@mote.org)> wrote:

Hi Jenn & Tonya:

We have a question for the two of you that relates to our upcoming OCEARCH expedition in Nova Scotia. If we are unable to obtain baleen whale material for our shark studies, we are contemplating the use of seal blubber instead. To that thought we have two questions:

- 1- Are we approved/permitted to use seal blubber in the exact same way that our current permits describe for our use of whale material? (Jenn?)
- 2- Is seal material more readily available in Nova Scotia? (Tonya?)

We're grateful for your guidance with these questions.

Bob

--

**ROBERT E. HUETER, Ph.D.**

*Chief Science Advisor, OCEARCH*

*Senior Scientist & Director, Center for Shark Research*

*Perry W. Gilbert Chair in Shark Research*

*Manager, Sharks & Rays Conservation Research Program*

*Mote Marine Laboratory*

1600 Ken Thompson Parkway

Sarasota, FL 34236 USA

[rhuetter@mote.org](mailto:rhuetter@mote.org)

Tel: 941-388-1827

Fax: 941-388-4312

More info at: [www.mote.org](http://www.mote.org)

--

*"From space, the planet is blue. From space, the planet is the territory, not of humans, but of the whale" - Heathcote Williams*

Tonya Wimmer, MSc.

Director, Marine Animal Response Society

1-866-567-6277

[www.marineanimals.ca](http://www.marineanimals.ca)

&

Whitehead Lab

Dalhousie University, Halifax, Nova Scotia, Canada

**MacDonald, Jennifer**

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**From:** Humphrey, Donald  
**Sent:** August-17-18 3:41 PM  
**To:** Spence, Koren R; Bieren, Stacey  
**Cc:** Deller, Sarah; MacDonald, Jennifer  
**Subject:** FW: Question about seals

Stacey, I believe that RM was engaged in the discussions about OCEARCH using marine mammal carcasses to fish for sharks. They are now requesting whether permits are required for the use of seal blubber? This is outside of our mandate so I am passing it along. Can you please discuss with Sarah?

Thanks, Donald

-----Original Message-----

**From:** Deller, Sarah  
**Sent:** August-17-18 3:34 PM  
**To:** Humphrey, Donald  
**Subject:** FW: Question about seals

Not sure if you're still there and can handle this today. If not, I'll take a look Monday.

---

**From:** Robert Hueter [rhueter@mote.org]  
**Sent:** August 17, 2018 2:48 PM  
**To:** Deller, Sarah  
**Cc:** Chris Fischer  
**Subject:** Fwd: Question about seals

Hi Sarah:

I sent the email below to Jenn MacDonald and got her automatic reply [REDACTED] She has been handling our SARA permit needs for an upcoming shark research expedition aboard the vessel OCEARCH. Can you please read the request below and let me know if you can help us with these questions?

Thank you --  
Dr. Bob Hueter

ROBERT E. HUETER, Ph.D.  
Chief Science Advisor, OCEARCH  
Senior Scientist & Director, Center for Shark Research Perry W. Gilbert Chair in Shark Research Manager, Sharks & Rays  
Conservation Research Program Mote Marine Laboratory  
1600 Ken Thompson Parkway  
Sarasota, FL 34236 USA

[rhueter@mote.org](mailto:rhueter@mote.org)<<mailto:rhueter@mote.org>>  
Tel: 941-388-1827  
Fax: 941-388-4312  
More info at: [www.mote.org](http://www.mote.org)<<http://www.mote.org>>



----- Forwarded Message -----

Subject: Question about seals

Date: Fri, 17 Aug 2018 13:41:37 -0400

From: Robert Hueter <[rhueter@mote.org](mailto:rhueter@mote.org)><<mailto:rhueter@mote.org>>

Organization: Mote Marine Laboratory

To: Jennifer MacDonald <[Jennifer.MacDonald@dfo-mpo.gc.ca](mailto:Jennifer.MacDonald@dfo-mpo.gc.ca)><<mailto:Jennifer.MacDonald@dfo-mpo.gc.ca>>, Tonya

Wimmer <[twimmer@marineanimals.ca](mailto:twimmer@marineanimals.ca)><<mailto:twimmer@marineanimals.ca>>

CC: Chris Fischer <[chris@oceanarch.org](mailto:chris@oceanarch.org)><<mailto:chris@oceanarch.org>>

Hi Jenn & Tonya:

We have a question for the two of you that relates to our upcoming OCEARCH expedition in Nova Scotia. If we are unable to obtain baleen whale material for our shark studies, we are contemplating the use of seal blubber instead. To that thought we have two questions:

- 1- Are we approved/permitted to use seal blubber in the exact same way that our current permits describe for our use of whale material? (Jenn?)
- 2- Is seal material more readily available in Nova Scotia? (Tonya?)

We're grateful for your guidance with these questions.

Bob

--

ROBERT E. HUETER, Ph.D.

Chief Science Advisor, OCEARCH

Senior Scientist & Director, Center for Shark Research Perry W. Gilbert Chair in Shark Research Manager, Sharks & Rays

Conservation Research Program Mote Marine Laboratory

1600 Ken Thompson Parkway

Sarasota, FL 34236 USA

[rhueter@mote.org](mailto:rhueter@mote.org)<<mailto:rhueter@mote.org>>

Tel: 941-388-1827

Fax: 941-388-4312

More info at: [www.mote.org](http://www.mote.org)<<http://www.mote.org/>>

## MacDonald, Jennifer

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**From:** Deller, Sarah  
**Sent:** August-20-18 3:01 PM  
**To:** Robert Hueter  
**Cc:** Chris Fischer; MacDonald, Jennifer; Humphrey, Donald  
**Subject:** RE: Question about seals

Hi Bob,

With respect to your SARA permit, which does not specify whale material vs. seal blubber, there would be no issues with using seal as long as you are not moving marine mammal parts between provinces and do not deviate from the other conditions described in your permit.

I believe your Fishery (General) Regulations Section 52 licence states: "Marine mammal parts may not be offered to sharks for feeding or consumption, may not be ingested by sharks, and pieces of marine mammal tissue may not be thrown overboard to attract sharks." Therefore, you should also be okay to use seal blubber under this licence, within the parameters outlined therein, since seals are also marine mammals.

Please feel free to let me know if you have any further questions.

Sarah

***Sarah Deller***

Species at Risk Listing Coordinator

Ecosystem Management  
Species at Risk Management Division  
Fisheries and Oceans Canada/Government of Canada  
[Sarah.deller@dfo-mpo.gc.ca](mailto:Sarah.deller@dfo-mpo.gc.ca) | Telephone: 902-426-6111

Gestion des écosystèmes  
Division de la gestion des espèces en péril  
Pêches et Océans Canada/Gouvernement du Canada  
[Sarah.Deller@dfo-mpo.gc.ca](mailto:Sarah.Deller@dfo-mpo.gc.ca) | Téléphone: 902-426-6111

**From:** Robert Hueter <[rhuetter@mote.org](mailto:rhuetter@mote.org)>  
**Sent:** Friday, August 17, 2018 2:49 PM  
**To:** Deller, Sarah <[Sarah.Deller@dfo-mpo.gc.ca](mailto:Sarah.Deller@dfo-mpo.gc.ca)>  
**Cc:** Chris Fischer <[chris@oearch.org](mailto:chris@oearch.org)>  
**Subject:** Fwd: Question about seals

Hi Sarah:

I sent the email below to Jenn MacDonald and got her automatic reply [REDACTED] She has been handling our SARA permit needs for an upcoming shark research expedition aboard the vessel *OCEARCH*. Can you please read the request below and let me know if you can help us with these questions?

Thank you --  
Dr. Bob Hueter

**ROBERT E. HUETER, Ph.D.**

*Chief Science Advisor, OCEARCH  
Senior Scientist & Director, Center for Shark Research  
Perry W. Gilbert Chair in Shark Research  
Manager, Sharks & Rays Conservation Research Program  
Mote Marine Laboratory  
1600 Ken Thompson Parkway  
Sarasota, FL 34236 USA*

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Tel: 941-388-1827  
Fax: 941-388-4312  
More info at: [www.mote.org](http://www.mote.org)

----- Forwarded Message -----

**Subject:** Question about seals

**Date:** Fri, 17 Aug 2018 13:41:37 -0400

**From:** Robert Hueter <[rhuetter@mote.org](mailto:rhuetter@mote.org)>

**Organization:** Mote Marine Laboratory

**To:** Jennifer MacDonald <[Jennifer.MacDonald@dfo-mpo.gc.ca](mailto:Jennifer.MacDonald@dfo-mpo.gc.ca)>, Tonya Wimmer

**CC:** Chris Fischer <[chris@oceanarch.org](mailto:chris@oceanarch.org)>

Hi Jenn & Tonya:

We have a question for the two of you that relates to our upcoming OCEARCH expedition in Nova Scotia. If we are unable to obtain baleen whale material for our shark studies, we are contemplating the use of seal blubber instead. To that thought we have two questions:

- 1- Are we approved/permitted to use seal blubber in the exact same way that our current permits describe for our use of whale material? (Jenn?)
- 2- Is seal material more readily available in Nova Scotia? (Tonya?)

We're grateful for your guidance with these questions.

Bob

--

**ROBERT E. HUETER, Ph.D.**

*Chief Science Advisor, OCEARCH  
Senior Scientist & Director, Center for Shark Research  
Perry W. Gilbert Chair in Shark Research  
Manager, Sharks & Rays Conservation Research Program  
Mote Marine Laboratory  
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Tel: 941-388-1827

Fax: 941-388-4312

More info at: [www.mote.org](http://www.mote.org)

No information has been removed or severed from this page

## MacDonald, Jennifer

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**From:** Humphrey, Donald  
**Sent:** August-28-18 9:50 AM  
**To:** MacDonald, Jennifer; Gromack, Aimee  
**Subject:** FW: Permit inquiries  
**Attachments:** \*\*\*\*\*SPAM\*\*\*\*\* Fwd: articles; \*\*\*\*\*SPAM\*\*\*\*\* Osearch

**Follow Up Flag:** Follow up  
**Flag Status:** Flagged

FYI

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**From:** Chiu, Scott **On Behalf Of** NCR SARA / LEP RCN (DFO/MPO)  
**Sent:** August-27-18 1:43 PM  
**To:** Humphrey, Donald  
**Subject:** FW: Permit inquiries

Hi, Donald

As far as I can tell, these are white shark related. For Maritimes' record. Not sure if these comments are actionable.

Scott

---

**From:** Registre LEP / SARA Registry (EC) [<mailto:ec.registrellep-sararegistry.ec@canada.ca>]  
**Sent:** August-27-18 8:07 AM  
**To:** NCR SARA / LEP RCN (DFO/MPO)  
**Subject:** Permit inquiries

Hi DFO,

For your action, svp. Please copy "[ec.registrellep-sararegistry.ec@canada.ca](mailto:ec.registrellep-sararegistry.ec@canada.ca)" on any response.

Thanks

Dave

**MacDonald, Jennifer**

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**From:** [REDACTED]  
**Sent:** August-24-18 6:19 PM  
**To:** Registre LEP / SARA Registry (EC)  
**Subject:** \*\*\*\*\*SPAM\*\*\*\*\* Fwd: articles

Just incase you haven't seen these articles. This backs up everything that I have said to you. Not trying to be a smart ass but these guys are bad news. They have no scientific data to back up anything they say about mating or birthing. If you would like to talk my number is [REDACTED] There is still time to make this right and revoke their permits. Thank you

[REDACTED]

**Subject: RE: articles**

<https://www.scientificamerican.com/article/shark-fight-scientists-complain-about-rival-great-white-tagging/>

<https://news.nationalgeographic.com/2016/10/great-white-sharks-tagged-massachusetts-versus-ocearch/>

<http://fijisharkdiving.blogspot.com/2013/04/fischer-reality-check-comments-by-dr.html>

<http://www.huliq.com/10061/shark-wranglers-try-regroup-after-death-maya>

<http://www.huliq.com/10061/shark-wranglers-death-halts-ocearch-mission>

<https://abc7news.com/archive/8136819/>

<http://www.whitesharkvideo.com/ocearch-the-enemy.html>

<https://www.facebook.com/BoycottSharkWranglers/>

**MacDonald, Jennifer**

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**From:** [REDACTED]  
**Sent:** August-24-18 4:09 PM  
**To:** Registre LEP / SARA Registry (EC)  
**Subject:** \*\*\*\*\*SPAM\*\*\*\*\* Osearch

Trying to figure out why you are all of a sudden giving these guys a permit to come here in Nova Scotia for fund raising for an American organization. These guys are gangsters. Have you not read all the comments about these people. You need to do more research. The science world and research people are pisses at you guys for this. Have some balls and revoke this permit. I do smell something fishy here !!!!

[REDACTED]

## **OCEARCH Permit Application – Review of Alternatives**

### OCEARCH Permit Application

OCEARCH is proposing to conduct a research expedition in Canadian waters in September 2018 in which sharks will be caught and guided to a research platform:

- Actively attracting White Sharks to a vessel will be carried out by placing chum in the water using a variety of techniques (chum bags, chum boxes, bait tanks, chum tubes and decoys). The chum consists of whale blubber and oil, mackerel and tuna, and/or menhaden oil. OCEARCH will seek a marine mammal permit from DFO to authorize the use of marine mammal material in Canadian waters.
- White Sharks will be caught using a circle hook (20/0 or 27/0 with zero offset). The hooks will be rigged with a crossbar bite-blocker (30cm up the leader) to prevent the shark from swallowing the bait. The hook will be attached to stainless steel wire rope (3/32" or 1/8"); the leader is about 10m and will be attached to a braid rope with elasticity properties to reduce hard shock when the initial struggle ensues. Typically within 5-10 minutes of being caught, the White Shark is guided onto the hydraulic lift.
- White Sharks will be lifted out of the water on a hydraulic lift that is lowered off the research vessel. The lift, which includes side guides and an end gate to prevent the shark from swimming off, will be lowered below the waterline and the shark guided on. The lift will then be slowly raised above the water. Once on the lift, the hook will be removed from the shark's jaw.
- Blood and tissue sampling will be conducted while White Shark are onboard the vessel. A hypodermic puncture and biopsy punch will be used to obtain blood (<25ml), muscle (<5g), semen, and skin mucus samples.
- Implantation of internal acoustic tags will be conducted by making a surgical incision to insert a sterilized transmitter (1cm x 6cm) into the coelomic cavity. The incision will be sutured and the sutures will be absorbed over a period of time. OCEARCH is proposing to insert the internal acoustic tags in every White Shark (up to 20) caught in Canadian waters.
- Attachment of satellite tags will be conducted by drilling and bolting Smart Position or Temperature (SPOT) tags on the leading edge of the first dorsal fin. The SPOT tags (Wildlife Computers Model SPOT-257) measure 162 x 57 x 20 mm and weigh 160 g. To attach the tag, four holes are drilled in the dorsal fin with an electric drill (drill bit will be cleaned and sterilized in alcohol before use). The tag will be attached with alcohol-sterilized nylon bolts, stainless locknuts and plastic spacers (standard hardware from the tag manufacturer). Tags will be coated with an antifouling compound. The hardware is designed to retain the tag for five years, after which it will fail and the tag will detach. OCEARCH is proposing to attach a SPOT tag to every White Shark (up to 20) caught in Canadian waters.
- Pop-up Satellite Archival Tags (PSAT) will be attached via a tether to a subdermal metal dart implanted in the shark's flank below the first dorsal fin. PSAT tags are provided to OCEARCH by a collaborator at the Woods Hole Oceanographic Institution. The number of tags has not been confirmed, but will likely be 4-6 tags. The PSAT tags will be attached, in addition to acoustic and SPOT tags, on the largest 4-6 animals.



### Overview of Tags Types:

- SPOT tags transmit location data in real time; they may transmit data for up to 3-5 years; provide the most accurate geolocation data
- PSAT tags store data to be transmitted after the tag detaches; they will collect data for approx. 1 year; provide temperature and depth data (in addition to geolocation data)
- Acoustic tags detect presence of an animal in areas where underwater acoustic receivers have been deployed (typically well-studied inshore areas)

	<b>Capture and Use of Lift</b>	<b>Capture and Tag in Water</b>	<b>No Capture</b>
<b>Tag Types</b>	SPOT PSAT Acoustic (internal or external)	SPOT PSAT Acoustic (external)	PSAT Acoustic (external)
<b>Other Samples</b>	<ul style="list-style-type: none"><li>• blood samples</li><li>• swabs (skin mucus, gill surface and cloacal swabs)</li><li>• muscle samples</li><li>• parasite samples</li><li>• semen samples</li><li>• fecal samples</li><li>• urine samples (opportunistic)</li><li>• eye/tail measurements</li><li>• ultrasound</li></ul>	<ul style="list-style-type: none"><li>• blood samples</li><li>• swabs (skin mucus)</li><li>• muscle samples</li></ul>	<ul style="list-style-type: none"><li>•</li></ul>

## MacDonald, Carl

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**From:** Cleveland, Charlene  
**Sent:** 2018–September-17 10:02 AM  
**To:** MacDonald, Carl  
**Subject:** RE: Ocearch white shark tagging - Licence  
**Attachments:** 350948 - OCEARCH, September 1 to October 31, 2018.pdf

Hi Carl – attached is a copy of the Foreign Vessel Licence that was issued to the OCEARCH.

Charlene Cleveland  
Licensing Officer  
Martimes Region – Dartmouth  
Phone: 902-426-1929  
[Charlene.cleveland@dfo-mpo.gc.ca](mailto:Charlene.cleveland@dfo-mpo.gc.ca)

---

**From:** MacDonald, Carl  
**Sent:** 2018–September-17 9:52 AM  
**To:** Cleveland, Charlene  
**Subject:** Oearch white shark tagging - Licence

Hi Charlene,

Can you provide me with the Final copy of the foreign licence, (permit) we provided OCEARCH to come to Canadian waters and tags white sharks.  
C&P is requesting.

Carl

Carl MacDonald  
Resource Management  
Fisheries & Oceans Canada | Government of Canada  
[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca) | Tel: 902-293-8257 | Fax: 902-426-7967

Regional agent principal de gestion des peches, Gestion des ressources  
Pêches et Océans Canada | Gouvernement du Canada  
[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca) | Tél: 902-293-8257 | Télécopieur: 902-426-7967

**Pages 810 to / à 814  
are duplicates of  
sont des duplicatas des  
pages 827 to / à 831**

## **MacDonald, Jennifer**

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**From:** Gromack, Aimee  
**Sent:** September-24-18 8:47 AM  
**To:** MacDonald, Jennifer  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Yes definitely! Mike W phoned Glen while we were on the vessel because it seemed like it would be hard to get an amendment expedited given the difficulty in getting that licence and also because OCEARCH only had a generic licencing email address embedded in the licence. It would be good if we could give them an actual person's name. I wonder who the licence came from, you'd think they would have had a contact person when they received it. When I asked about that, I didn't get an answer from Bob.... I think they were a little disorganized and it threw them off when we asked to see their SARA permit.

Looking forward to chatting with you!

Aimee

---

**From:** MacDonald, Jennifer  
**Sent:** September-24-18 8:40 AM  
**To:** Gromack, Aimee  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

I can follow-up with them; just as an aside, I think in future, I would just give OCEARCH the contact info of licencing and have them confirm this for themselves, so we are not interpreting the information for them as the licence is outside our control (and I don't fully understand the whole process!).

Jenn

**Jennifer MacDonald**  
Species at Risk Management Division  
(902) 407-8175

---

**From:** Gromack, Aimee  
**Sent:** September-24-18 8:28 AM  
**To:** MacDonald, Jennifer  
**Subject:** FW: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

FYI – Foreign Vessel Licence.

Can you advise OCEARCH on this? I am happy to but since you are the permit person I thought you would want to do this ☺

---

**From:** Gromack, Aimee  
**Sent:** September-21-18 1:04 PM  
**To:** Cleveland, Charlene; Herbert, Glen  
**Cc:** Wambolt, Michael  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Thank you very much Charlene. That is helpful. If they request and amendment that is likely to go into the Gulf Region, I will let you know. I doubt they would go that far, but you never know.

---

**From:** Cleveland, Charlene  
**Sent:** September-21-18 1:02 PM  
**To:** Gromack, Aimee; Herbert, Glen  
**Cc:** Wambolt, Michael  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

As long as they conduct their activity in the Location of Fishing Activity listed on the licence – there will be no violation.

According to the current Location of Fishing Activity the vessel is licenced to conduct activity in the waters off the coast of Cape Breton unless they round the corner to the Gulf side. If that is the case this licence does not authorized activity in Gulf Region area.

You will have get clarification from Ocearch regarding the request, as I cannot determine if there needs to be anything added to the licence.

Charlene

---

**From:** Gromack, Aimee  
**Sent:** 2018–September-21 12:00 PM  
**To:** Cleveland, Charlene; Herbert, Glen  
**Cc:** Wambolt, Michael  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Thanks Charlene.

I see they have "Locations of Fishing Activity" and "Cruise Destinations". I am not sure what "cruise destination" means exactly and why it doesn't match the "Locations of Fishing Activity". If they "cruise" outside of the defined areas (Mahone Bay, Bay of Fundy, Sable Island, and Placentia Bay), will they be in violation of the permit?

Thanks,

Aimee

---

**From:** Cleveland, Charlene  
**Sent:** September-21-18 11:52 AM  
**To:** Gromack, Aimee; Herbert, Glen  
**Cc:** Wambolt, Michael  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Hi Aimee - Attached is a copy of the current licence condition, which lists the Port of Calls on page 1. Please advise.

Charlene

---

**From:** Gromack, Aimee  
**Sent:** 2018–September-21 11:44 AM  
**To:** Cleveland, Charlene; Herbert, Glen  
**Cc:** Wambolt, Michael  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Hi Charlene,

Thanks for your quick response. Does the s.52 part of the Foreign Vessel licence specify the team can only go to Mahone Bay, the Bay of Fundy, and Sable Island? I only had a look at the licence onboard the vessel yesterday and do not have it

in front of me to confirm. If this is not specified and only relates to the Port of Calls, they would only need to change to that part of the permit. Can you let me know what the Port of Calls are?

Thanks,

Aimee

---

**From:** Cleveland, Charlene  
**Sent:** September-21-18 11:22 AM  
**To:** Herbert, Glen  
**Cc:** Gromack, Aimee; Wambolt, Michael  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Hi Glen – the current licence permits activity in all of the following ares: 5Ze, 4X, 5Y, 4W, 4Vs, 4Vn and 3Ps.

Any activity off the coast of Cape Breton would currently be covered by the current licence. Are they asking for a change in the Port of Calls recorded on the licence?

Please advise.

Charlene Cleveland  
Licensing Officer  
Maritimes Region – Dartmouth  
Phone: 902-426-1929  
[Charlene.cleveland@dfo-mpo.gc.ca](mailto:Charlene.cleveland@dfo-mpo.gc.ca)

---

**From:** Herbert, Glen  
**Sent:** 2018-September-21 10:21 AM  
**To:** Licence Maritimes / Permis Maritimes (DFO/MPO); Cleveland, Charlene  
**Cc:** Gromack, Aimee; Wambolt, Michael  
**Subject:** FW: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Good morning,

Yesterday, SARMD and FPP were aboard the Ocearch vessel for SARA permit monitoring purposes. The research team has inquired about their ability to adjust the area covered in the licence and activity approval. They are interested in heading up to Cape Breton later during their survey. We have advised them that they need to contact Licensing.

Their contact is Dr. Bob Heuter (sp?) at 

Aimee Gromack (SARMD, cc'd here) is happy to help facilitate this but are not sure about the process for such an amendment.

Thanks,  
Glen

---

Glen Herbert  
Regional Manager  
Oceans and Coastal Management Division  
Ecosystem Management Branch

Fisheries and Oceans Canada – Maritimes Region  
Bedford Institute of Oceanography  
1 Challenger Dr., PO Box 1006  
5th Floor, Polaris Bldg.  
Dartmouth, NS, B2Y 4A2  
Tel: (902) 802 7051  
Email: [glen.herbert@dfo-mpo.gc.ca](mailto:glen.herbert@dfo-mpo.gc.ca)

---

**From:** Cleveland, Charlene  
**Sent:** May-28-18 2:21 PM  
**To:** Docherty, Verna; MacDonald, Carl; Vézina, Alain; Pye, Brad; Herbert, Glen  
**Cc:** Berthier, Jacinta; Daley, Annette  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

As per Verna's e-mail, please find attached the draft version of the Foreign Fishing Vessel Licence Approval form for the OCEARCH. I have added the comments and/or conditions provided to date. The attached email and Schedule 38 from Erin Dunne, NL Region, will be attached to the licence prior to issuance. Please change or add to the document, as necessary.

Please feel free to contact me should you have questions.

Charlene Cleveland  
Licensing Officer  
Maritimes Region – Dartmouth  
Phone: 902-426-1929  
[Charlene.cleveland@dfo-mpo.gc.ca](mailto:Charlene.cleveland@dfo-mpo.gc.ca)

---

**From:** Docherty, Verna  
**Sent:** 2018-May-28 2:10 PM  
**To:** Cleveland, Charlene; MacDonald, Carl; Vézina, Alain; Pye, Brad; Herbert, Glen  
**Cc:** Berthier, Jacinta; Licence Maritimes / Permis Maritimes (DFO/MPO); Daley, Annette  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Good afternoon all.

By copy of this email, I'll ask Charlene to recirculate the Foreign Fishing Vessel Licence Approval form to all to review their original input. If there are concerns that can be addressed by the addition of conditions of licence, please provide the exact wording that you would like to have included, including specifics on reporting timelines, addresses to submit reports, etc.

I note that RM (Carl) has a question on the shark species that are the subject of the research. If there are additional questions, please let Licensing know ASAP so we can coordinate our communications with the proponent.

As always, if you have any questions for me, I'm happy to discuss.

Kind regards,  
Verna

**From:** Vézina, Alain  
**Sent:** Monday, May 28, 2018 7:08 AM  
**To:** Daley, Annette <[Annette.Daley@dfo-mpo.gc.ca](mailto:Annette.Daley@dfo-mpo.gc.ca)>  
**Cc:** Berthier, Jacinta <[Jacinta.Berthier@dfo-mpo.gc.ca](mailto:Jacinta.Berthier@dfo-mpo.gc.ca)>; Docherty, Verna <[Verna.Docherty@dfo-mpo.gc.ca](mailto:Verna.Docherty@dfo-mpo.gc.ca)>;

MacDonald, Carl <Carl.MacDonald@dfo-mpo.gc.ca>; Licence Maritimes / Permis Maritimes (DFO/MPO)  
<RegionalLicensing.XMAR@dfo-mpo.gc.ca>; Herbert, Glen <Glen.Herbert@dfo-mpo.gc.ca>; Pye, Brad <Brad.Pye@dfo-mpo.gc.ca>; King, Rhea L <Rhea.King@dfo-mpo.gc.ca>; Lambert, Robert <Robert.Lambert@dfo-mpo.gc.ca>  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Thanks Annette,

From Science's perspective, conditions that flow from my concerns are those that are generally applied by coastal states under the UNCLOS MSR guidelines, i.e.

A preliminary report is submitted to <appropriate office in GAC> no later than x months after the end date of the authorized mission.

A copy of all the data collected during the marine scientific research activities is provided to us.

A copy of the final report produced that incorporates information obtained from the marine scientific research is provided to us no later than x years after the end of the mission.

These are the conditions that are imposed on us when we ask for permission to operate in US waters. I have no idea what GAC requires already in their consent letter and if these conditions are included. If they are, fine. If not, this is the minimum we need to do to ensure that we do our due diligence.

**IMPORTANT:** [REDACTED] RM also has some serious questions about use of bait, coordination with Canadian research, etc .... that should be turned into conditions. Also how will we ensure that the observer condition on the SARA permit is met? [REDACTED]

Alain

**From:** Daley, Annette

**Sent:** May 25, 2018 4:33 PM

**To:** Vézina, Alain <Alain.Vezina@dfo-mpo.gc.ca>

**Cc:** Berthier, Jacinta <Jacinta.Berthier@dfo-mpo.gc.ca>; Docherty, Verna <Verna.Docherty@dfo-mpo.gc.ca>;

MacDonald, Carl <Carl.MacDonald@dfo-mpo.gc.ca>; Licence Maritimes / Permis Maritimes (DFO/MPO)

<RegionalLicensing.XMAR@dfo-mpo.gc.ca>; Herbert, Glen <Glen.Herbert@dfo-mpo.gc.ca>; Pye, Brad <Brad.Pye@dfo-mpo.gc.ca>; King, Rhea L <Rhea.King@dfo-mpo.gc.ca>; Lambert, Robert <Robert.Lambert@dfo-mpo.gc.ca>

**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Alain and Rhea - The recommendation has not gone back to Global Affairs so Ocearch has not been informed. Therefore we will go back around with the review process and perhaps Alain, there is a section in the form to add conditions that would be required to be met under the RDGs signature if we wanted to go that route rather than denying the application. Apparently NL is authorizing some work in Placentia Bay.

*Annette*

**From:** Vézina, Alain

**Sent:** Wednesday, May 23, 2018 1:37 PM

**To:** MacDonald, Carl <Carl.MacDonald@dfo-mpo.gc.ca>; Licence Maritimes / Permis Maritimes (DFO/MPO)

<RegionalLicensing.XMAR@dfo-mpo.gc.ca>; Herbert, Glen <Glen.Herbert@dfo-mpo.gc.ca>; Pye, Brad <Brad.Pye@dfo-mpo.gc.ca>

**Cc:** Daley, Annette <Annette.Daley@dfo-mpo.gc.ca>; Berthier, Jacinta <Jacinta.Berthier@dfo-mpo.gc.ca>

**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

With respect to the questions on the science section of the approval form:



This research activity will **not** contribute to the Canadian scientific community. Canadian collaborators do not see the benefit of working with Ocearch, even though they have contacted all major Atlantic Universities (Dal, Memorial, Acadia etc), DFO (Heather Bowlby, Mark Simpson), non-profits (Grand Manan Seabird and Whale Research), OTN over the last 2 years. As pointed out by Carl, Heather holds a SARA permit and has an equivalent tagging program for white shark (aka duplication of research effort on a single population of an endangered species). The area that Heather works out of is the outside of St. Margret's Bay or immediately adjacent to Mahone Bay. The main tag type they use is optimized for instantaneous geolocation (excellent opportunities for twitter) but gives no information on habitat use – as needed for SARA research questions.

Canadian scientists will **not** have access to the research data. [REDACTED]

Based on this information, I cannot recommend approval at this time. The amended approval form is attached.

Although I did not change the response in the form, I have no record of a previous approval for this organization.

Outside of my purview, but I understand that the SARA permit requires a DFO observer during at least part of their trip. How will that condition be fulfilled?

Alain

From: MacDonald, Carl

Sent: May 23, 2018 10:32 AM

To: Licence Maritimes / Permis Maritimes (DFO/MPO) <[RegionalLicensing.XMAR@dfo-mpo.gc.ca](mailto:RegionalLicensing.XMAR@dfo-mpo.gc.ca)>; Vézina, Alain

<[Alain.Vezina@dfo-mpo.gc.ca](mailto:Alain.Vezina@dfo-mpo.gc.ca)>; Herbert, Glen <[Glen.Herbert@dfo-mpo.gc.ca](mailto:Glen.Herbert@dfo-mpo.gc.ca)>; Pye, Brad <[Brad.Pye@dfo-mpo.gc.ca](mailto:Brad.Pye@dfo-mpo.gc.ca)>

Cc: Daley, Annette <[Annette.Daley@dfo-mpo.gc.ca](mailto:Annette.Daley@dfo-mpo.gc.ca)>; Berthier, Jacinta <[Jacinta.Berthier@dfo-mpo.gc.ca](mailto:Jacinta.Berthier@dfo-mpo.gc.ca)>

Subject: RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Questions/Comments Regarding Proposed Research:

- Would it be possible for the researcher to describe the bait type they propose to use? ie Will the researcher be using Marine Mammal parts for Bait? If so, where will this Marine Mammal bait be acquired?
- Would it be possible for the researcher to be more specific regarding the shark species intended for this research? Currently the document only indicates Shark Species - including White Shark.
- It is important to note that Canadian shark researcher (Heather Bowlby) has been approved to conducted research on the same species (White Shark) in the same area (Mahone Bay).

Regards,

Carl MacDonald

Resource Management

Fisheries & Oceans Canada | Government of Canada

[Carl.MacDonald@dfo-mpo.gc.ca](mailto:Carl.MacDonald@dfo-mpo.gc.ca) | Tel: 902-293-8257 | Fax: 902-426-7967

Regional agent principal de gestion des peches, Gestion des ressources

Pêches et Océans Canada | Gouvernement du Canada  
Carl.MacDonald@dfo-mpo.gc.ca | Tél: 902-293-8257 | Télécopieur: 902-426-7967

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**From:** MacDonald, Carl  
**Sent:** 2018-May-22 4:06 PM  
**To:** Licence Maritimes / Permis Maritimes (DFO/MPO); Vézina, Alain; Herbert, Glen; Pye, Brad  
**Cc:** Daley, Annette  
**Subject:** RE: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Large Pelagic Comments:

1. *Large pelagic sector.* Pelagic longline fishing takes place along the edge of the Scotian Shelf where the large pelagic fleet conducts operations. Caution must be taken to ensure that the scientific research vessel does not cross previously deployed pelagic longlines which run near the surface for distances of 30 - 40 nm. Damaged gear and identifying marks are to be reported to DFO ([Brad.Pye@dfo-mpo.gc.ca](mailto:Brad.Pye@dfo-mpo.gc.ca)) immediately. Vessel is to continuously broadcast an AIS signal.
  - Swordfish longline gear may be in other areas.
  - Pelagic Longline Gear have AIS beacons attached.
  - Beacons from a licence holder have the same vessel prefix on each beacon [REDACTED]
  - There will be a string of beacons on a line. It is not possible to travel between the beacons with the research vessel.
  - It is possible to travel a suitable distance alongside a pelagic longline set.

Regards,

Carl MacDonald  
 Resource Management  
 Fisheries & Oceans Canada | Government of Canada  
Carl.MacDonald@dfo-mpo.gc.ca | Tel: 902-293-8257 | Fax: 902-426-7967

Régional agent principal de gestion des pêches, Gestion des ressources  
 Pêches et Océans Canada | Gouvernement du Canada  
Carl.MacDonald@dfo-mpo.gc.ca | Tél: 902-293-8257 | Télécopieur: 902-426-7967

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**From:** Licence Maritimes / Permis Maritimes (DFO/MPO)  
**Sent:** 2018-May-18 10:24 AM  
**To:** Vézina, Alain; Herbert, Glen; Pye, Brad; MacDonald, Carl  
**Cc:** Daley, Annette  
**Subject:** FW: IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)  
**Importance:** High

Good morning – the response time has been changed to June 1<sup>st</sup> instead of the original August 1<sup>st</sup> request.

Please review and provide comments/approval for the attached Foreign Vessel Cruise for Scientific Research (Shark species including White Shark).

I have asked NCR to have the applicant provide us with a Map of the Area to be studied, as the areas are only recorded under section 3 of the application. Placentia Bay, Nfld is listed, but as we do not licence vessels for other waters, I will notify Nfld licensing that this application will be reviewed and no doubt, approved for our waters. If Nfld requests that Placentia Bay be included, we will do that.

Thanks and have a nice day!

Charlene Cleveland  
Regional Officer, Licensing Services  
Dept of Fisheries & Oceans  
Dartmouth, Nova Scotia  
Tel: (902) 426-9966  
Fax: (902) 426-5010  
[Licence.maritimes.permis@dfo-mpo.gc.ca](mailto:Licence.maritimes.permis@dfo-mpo.gc.ca)

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**From:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO)  
**Sent:** 2017–November-30 1:14 PM  
**To:** Licence Maritimes / Permis Maritimes (DFO/MPO); Duggan, Charmaine; Kean, Jackie; Bowdring, Tony  
**Cc:** NCR-Vessel-Clearance / Degagement-navire-RCN (DFO/MPO); Lavigne, Élise; Farr, Connie; Chmiel, Jim;  
[HlxEcareg1@innav.gc.ca](mailto:HlxEcareg1@innav.gc.ca)  
**Subject:** IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)

Good afternoon,

Please see attached US Marine Scientific Research (MSR) request for the **OCEARCH, Sep 1 – Oct 31, 2018**. It appears as though the proponent intends to conduct work in both Newfoundland and Maritimes Regions (though primarily in Maritimes).

The vessel intends to call on Halifax, NS, between **Sep 9 – Oct 31, 2018**, for provisioning.

We kindly request all responses by **August 1, 2018**.

Best wishes,

Andrew

## MacDonald, Jennifer

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**From:** Robert Hueter <rhuetter@mote.org>  
**Sent:** September-24-18 9:36 AM  
**To:** MacDonald, Jennifer; Gromack, Aimee  
**Cc:** chris@ocearch.org; Wambolt, Michael  
**Subject:** Re: Follow-up on SARA permit and White Shark sightings info  
**Attachments:** 350948 - OCEARCH, September 1 to October 31, 2018 - FISHING LICENSE.pdf

Good morning Jenn:

Thanks for that website, very helpful. So it looks like we're already licensed to fish all the way from the Bay of Fundy around the entire Atlantic coast of Nova Scotia to the northern tip of Cape Breton, because our fishing license (attached) lists these zones: 5ZE, 4X, 5Y, 4W, 4VS, 4VN and 3PS. We're not licensed to fish on the west side of Cape Breton (4T) but I don't think we're looking to go that far. So it appears we're good to go on the fishing side. We just need a SARA permit amendment to go as far north as Meat Cove on Cape Breton. As to when, hard to say... we've moved a bit south of our previous location and are now going to fish near West Ironbound Island, to get out of the wind. Cape Breton wouldn't be for at least another few days or a week, if ever. Our fishing is scheduled to end Oct 10. So if you could please amend our SARA permit to allow this flexibility, that would be great.

By the way, yesterday we had a large white shark briefly around our ship north of Cross Island. Just checking us out but did not take any of our baits. The fishing continues... they're here, no question. Just hope we can get a few before the weather curtails us.

Cheers,  
Bob

**ROBERT E. HUETER, Ph.D.**  
*Senior Scientist & Director, Center for Shark Research*  
*Perry W. Gilbert Chair in Shark Research*  
*Manager, Sharks & Rays Conservation Research Program*  
*Mote Marine Laboratory*  
*1600 Ken Thompson Parkway*  
*Sarasota, FL 34236 USA*

*Chief Science Advisor, OCEARCH*

[rhuetter@mote.org](mailto:rhuetter@mote.org)  
Tel: 941-388-1827  
Fax: 941-388-4312  
More info at: [www.mote.org](http://www.mote.org)

On 9/24/2018 7:15 AM, MacDonald, Jennifer wrote:

Good morning Bob,

Thanks for the follow-up below to Aimee's email.

You're find a map of fisheries zones at the following link: <http://geoportal.gc.ca/eng/Maps/Viewer/6#fc>.  
This should help you determine if your Foreign Vessel Licence will require an amendment.

With respect to your SARA permit; if you could specify exactly where you would like us to consider as additional areas (is it just the eastern coast of Cape Breton?), then I will work on that. If you could also let me know when you would be looking to relocate there, that would be helpful.

Regards,  
Jenn

**Jennifer MacDonald**  
Species at Risk Management Division  
(902) 407-8175

---

**From:** Robert Hueter [<mailto:rhuetter@mote.org>]  
**Sent:** September-22-18 3:28 PM  
**To:** Gromack, Aimee; MacDonald, Jennifer  
**Cc:** [chris@ocearch.org](mailto:chris@ocearch.org); Wambolt, Michael  
**Subject:** Re: Follow-up on SARA permit and White Shark sightings info

Hi again, Aimee, one more thing if you don't mind: Could you or someone else point us to a graphic online that shows the fisheries zones around Nova Scotia? Currently we're licensed to fish in zones 5ZE, 4X, 5Y (Bay of Fundy), 4W, 4VS, 4VN and 3PS. Hard to find what that applies to. Can you help? Thank you - Bob

**ROBERT E. HUETER, Ph.D.**  
*Senior Scientist & Director, Center for Shark Research*  
*Perry W. Gilbert Chair in Shark Research*  
*Manager, Sharks & Rays Conservation Research Program*  
*Mote Marine Laboratory*  
*1600 Ken Thompson Parkway*  
*Sarasota, FL 34236 USA*

*Chief Science Advisor, OCEARCH*

[rhuetter@mote.org](mailto:rhuetter@mote.org)  
Tel: 941-388-1827  
Fax: 941-388-4312  
More info at: [www.mote.org](http://www.mote.org)

On 9/22/2018 10:55 AM, Robert Hueter wrote:

Hi Aimee:

Great having you and Mike on the ship. The weather's dicey today so we've held back at the dock a bit, but are heading out now.

On your points:

1- We have printed copies of all the permits in a binder now to show to any authorities on request. The crew has read the permits before but we'll conduct a second round of review and will of course brief every new scientist coming on board during the expedition. The fishing crew will not change.

2- We've been in touch with Heather Bowlby about procedures if we should

encounter her PSAT-tagged shark, and all is good.

3- On amending our permits, yes we wish to request the flexibility to fish all along the Atlantic coast of Nova Scotia, up to and including the waters around Cape Breton Island. As you know our shark Hilton has spent the last two weeks off Cape Breton. We'd be very grateful for your and Jenn's help with that amendment to our SARA permit, and also any help you can give us for amending our Foreign Vessel Licence.

4- Thank you very much for the doc that includes white shark encounters. We'll take this info into consideration in our search.

5- We're searching our database now for white sharks in the approx. 4m range and will provide you total lengths and girths for all of those. We'll also provide the sex as females could be girthier than the males at that size.

Thanks so much for your help, back to you soon, wish us luck!

Bob

**ROBERT E. HUETER, Ph.D.**

*Senior Scientist & Director, Center for Shark Research  
Perry W. Gilbert Chair in Shark Research  
Manager, Sharks & Rays Conservation Research Program  
Mote Marine Laboratory  
1600 Ken Thompson Parkway  
Sarasota, FL 34236 USA*

*Chief Science Advisor, OCEARCH*

[rhuetter@mote.org](mailto:rhuetter@mote.org)

Tel: 941-388-1827

Fax: 941-388-4312

More info at: [www.mote.org](http://www.mote.org)

On 9/21/2018 12:03 PM, Gromack, Aimee wrote:

Hi Bob and Chris,

It was great to meet you and the rest of the crew yesterday and thank you for your excellent hospitality. Mike and I had a great experience even though we didn't get to witness a White Shark being tagged.

I have a few items I wanted to follow up with you on:

1. **Compliance with permit requirements.** To ensure that you meet the s. 73 *Species at Risk Act* permit requirements, please:
  - a. Ensure that you have a copy of the permit that is readily accessible onboard (paper would be preferred if a DFO Fishery Officer were to board your vessel – same goes for the Foreign Vessel Licence containing the *Fisheries Act* General Regulations s.52 permit).

- b. Ensure and that all persons undertaking the activities covered by the permit (i.e., anyone that interacts with the White Shark in any way) is familiar with the conditions of the permit → this includes any new staff that arrive later.
2. As we discussed, if you see that a White Shark has a tag, please do not attempt to catch it (or release it if a tag is seen after the shark is hooked).
3. **Amendment to Permits.** Please let me know if you would like to request an amendment and I will pass your request along for action. I am looking into the Foreign Vessel Licence amendment process.
4. **Sightings information.** Please see Appendix 1 of the attached publication for a list of White Shark records in Atlantic Canada (excludes tagged shark detections). There were more sightings this year but most were in the Bay of Fundy. There was a sighting at Big Tusket Island in Southwest NS as well – copy and paste this link into your browser: <https://www.cbc.ca/news/canada/nova-scotia/watch-curious-great-white-shark-swim-alongside-boat-near-yarmouth-1.4792010>
5. **Girth measurements.** It would be great if you could provide the girth measurements you have for White Sharks that are close to 4.0 m so we can make an accurate model for display at the Bedford Institute of Oceanography. Could you provide a few girth measurements for White Sharks as close to 4 m in length as possible?

If things start to get sharky we hope to get back to the boat. I will check your twitter feed and will be in touch!

Thanks again and please don't hesitate to call if you have any questions.

Cheers,

**Aimee Gromack BSc, MMM**  
*Species at Risk Biologist*

Species at Risk Management Division | Division de la gestion des  
espèces en péril  
Fisheries & Oceans Canada | Pêches et Océans Canada  
Bedford Institute of Oceanography | Institut océanographique de  
Bedford  
1 Challenger Dr, PO Box 1006, Stn B501 | 1 promenade Challenger, CP  
1006, Stn B501  
Dartmouth, NS B2Y 4A2 | Dartmouth, N-É B2Y 4A2  
[Aimee.Gromack@dfo-mpo.gc.ca](mailto:Aimee.Gromack@dfo-mpo.gc.ca)  
Tel | Tél. 902-403-6277  
Fax | Télécopieur 902-426-2331



# REGISTRATION(S) AND/OR FISHING LICENCE(S)

This document authorizes the registration card holder and/or licence holder to engage in fishing and related activities on the Atlantic coast of Canada subject to the provisions of the Fisheries Act and Regulations made thereunder.

This licence and/or registration is issued under the authority of the Minister of Fisheries and Oceans Canada.

FIN 700020037

CALENDAR YEAR 2018

ISSUANCE DATE: AUGUST 10, 2018

OCEARCH  
1790 BONANZA DR.  
SUITE 101  
PARK CITY UT 84060, UN

HOMEPORT

12101 HALIFAX

Licence(s) - 2018

Licence #	Species	Areas	Licence Type	Gear Permitted	Amt	VRN	LOA
350948	ITEMS UNSPECIFIED					108412	124.6 7'

AGENT:

CHRIS FISCHER  
1790 BONANZA DRIVE  
SUITE 101  
PARK CITY, UT 84060 US  
MASTER:

CAPT BRETT MCBRIDE  
CAPT DAVID STEVENSON

ACTIVITIES:

RESEARCH OBJECTIVES: EXPEDITION NOVA SCOTIA - F2017-120 - TO COLLECT CRITICAL SCIENTIFIC DATA RELATED TO TELEMETRY AND BIOLOGICAL STUDIES OF KEYSTONE MARINE SHARK SPECIES.

LOCATION OF FISHING ACTIVITY: 5ZE, 4X, 5Y (BAY OF FUNDY), 4W, 4VS, 4VN AND 3PS

GEAR: HOOK AND LINE, MOUSETRAP DRUM RIG SPECIALLY DESIGNED LIFT SYSTEM, CHASE BOATS AND OTHER OCEANOGRAPHIC EQUIPMENT

DATES OF FISHING ACTIVITY: SEPTEMBER 1 TO OCTOBER 31, 2018

PORT CALLS AND ACTIVITIES:

HALIFAX, NOVA SCOTIA: ARRIVAL - SEPTEMBER 1, 2018  
DEPARTURE - SEPTEMBER 12, 2018

CRUISE DESTINATIONS: SEPTEMBER 13 TO OCTOBER 10, 2018 - MAHONE BAY, NS; BAY OF FUNDY, NS; SABLE ISLAND, NS AND PLACENTIA BAY, NL

HALIFAX, NOVA SCOTIA: ARRIVAL - OCTOBER 11, 2018  
DEPARTURE - OCTOBER 31, 2018

NANTUCKET, MASSACHUSETTS, US - NOVEMBER 3, 2018

SPECIAL CONDITIONS - RESOURCE MANAGEMENT CONDITIONS:

- The licence holder is authorized to conduct research on the following shark species: White Shark, Blue Shark, Porbeagle Shark, Common Thresher Shark and Shortfin Mako Shark.
- Marine mammal parts may not be offered to sharks for feeding or consumption and may not be ingested by sharks, and pieces of marine mammal tissue may not be thrown overboard to attack sharks.
- Efforts to lure, capture, or tag sharks is not authorized to occur in close proximity (within two nautical miles) or endangered whale species, including North Atlantic Right Whales (*eubalaena glacialis*).

It is a condition of this licence that the registration holder/licencee sign all pages of this document.

FISHER

DATE

Canada





# REGISTRATION(S) AND/OR FISHING LICENCE(S)

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FIN 700020037

CALENDAR YEAR 2018  
ISSUANCE DATE: AUGUST 10, 2018

OCEARCH  
1790 BONANZA DR.  
SUITE 101  
PARK CITY UT 84060, UN

HOMEPORT  
12101 HALIFAX

Licence #	Species	Areas	Licence Type	Gear Permitted	Amt	VRN	LOA
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## SPECIAL CONDITIONS - SCIENCE

1. A copy of all data collected during the marine science research activities that are the subject of this consent letter is to be sent by email to the following email address, and should include 'IGR-351: US MSR Request OCEARCH (Sep 1 - Oct 31 2018)' in the subject line: Shark.mar@dfo-mpo.gc.ca

2. A copy of the final report produced that incorporates information obtained from the marine scientific research that is the subject of this application is to be sent no later than two (2) years after the end date of the timeframe specified in this consent letter to the following address:

Regional Director, Science  
Maritimes Region  
Fisheries and Oceans Canada  
Bedford Institute of Oceanography  
1 Challenger Drive  
Dartmouth, NS B2Y 4A2

## SPECIAL CONDITIONS - ECOSYSTEM MANAGEMENT

### Whales

1. R/V to report sightings of North Atlantic Right Whales (same day if possible) to DFO Maritimes Region. Contact: 1-844-800-8568; XMARWhalesightings@dfo-mpo.gc.ca. All whale records (post voyage), including location, date and photos, to be submitted to DFO Maritimes Region.

2. R/V to adhere to guidance contained in Canadian Coast Guard Annual Notice to Mariners: A2 - 5. GENERAL GUIDELINES FOR AQUATIC SPECIES AT RISK AND IMPORTANT MARINE MAMMAL AREAS: Grand Manan Basin Critical Habitat and Roseway Basin Critical Habitat/Area To Be Avoided. See: <https://www.notmar.gc.ca/publications/annual-annuel/section-a/a5-en.php>

3. R/V to report any collisions with whales, entangled whales or dead whales to the whale emergency hotline (1-866-567-6277), VHF Channel 16, or Fundy Traffic VHF Channel 14.

## ADDITIONAL C&P CONDITIONS

### Large Pelagic Comments:

1. Large pelagic sector. Pelagic longline fishing takes place along the edge of the Scotian Shelf where the large pelagic fleet conducts operations. Caution must be taken to ensure that the scientific research vessel does not cross previously deployed pelagic longlines which run near the surface for distances of 30 - 40 nm. Damaged gear and identifying marks are to be reported to DFO (Brad.Pye@dfo-mpo.gc.ca) immediately. Vessel is to continuously broadcast an AIS signal.

2. Swordfish longline gear may be in other areas.

3. Pelagic Longline Gear have AIS beacons attached.

4. Beacons from a licence holder have the same vessel prefix on each beacon.

5. There will be a string of beacons on a line. It is not possible to travel between the beacons with a research vessel.

6. It is possible to travel a suitable distance alongside a pelagic longline set.

It is a condition of this licence that the registration holder/licencee sign all pages of this document.

FISHER

DATE

Canada



# REGISTRATION(S) AND/OR FISHING LICENCE(S)

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This licence and/or registration is issued under the authority of the Minister of Fisheries and Oceans Canada.

FIN 700020037

CALENDAR YEAR 2018

ISSUANCE DATE: AUGUST 10, 2018

OCEARCH  
1790 BONANZA DR.  
SUITE 101  
PARK CITY UT 84060, UN

HOMEPORT

12101 HALIFAX

Licence #	Species	Areas	Licence Type	Gear Permitted	Amt	VRN	LOA
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A section 73 harm permit is required under the Species at Risk Act (SARA) and must be attached to the foreign licence when conducting shark study operations.

SPECIAL CONDITIONS - DFO - NL Resource Management

MARINE MAMMALS

While operating under this licence, you must abide by the conditions as described in Schedule 38 (MARINE MAMMAL INTERACTIONS AND MANAGEMENT MEASURES) which is be attached to this licence.

## 1.0 REGIONAL DIRECTOR-GENERAL

THE REGIONAL DIRECTOR-GENERAL DESIGNATED UNDER THE COASTAL FISHERIES PROTECTION REGULATIONS FOR THE PURPOSES OF THIS LICENCE IS THE REGIONAL DIRECTOR-GENERAL OF THE DEPARTMENT OF FISHERIES AND OCEANS FOR THE MARITIMES REGION.

## 1.2 TERMS AND CONDITIONS OF LICENCE

EVERY LICENCE IN RESPECT OF A FOREIGN FISHING VESSEL IS SUBJECT TO THE FOLLOWING TERMS AND CONDITIONS:

(A) THE VESSEL AND ITS CREW SHALL ENGAGE ONLY IN THE ACTIVITIES THAT ARE AUTHORIZED BY THE LICENCE;

(B) THE ACTIVITIES AUTHORIZED BY THE LICENCE SHALL BE CARRIED OUT ONLY AT THE TIMES AND IN THE AREAS OF CANADIAN FISHERIES WATERS OR PORTS SET OUT IN THE LICENCE;

(C) WHERE FISHING IS AUTHORIZED BY THE LICENCE

(I) THE CREW OF THE VESSEL SHALL FISH ONLY FOR A SPECIES OF FISH SPECIFIED IN THE LICENCE,

(II) THE CREW OF THE VESSEL SHALL NOT CATCH AND RETAIN ANY FISH OF A SPECIES, SIZE OR AGE SET OUT IN THE LICENCE AS PROHIBITED CATCHES, AND WHERE SUCH FISH ARE CAUGHT THEY SHALL BE RETURNED TO THE WATER, ALIVE IF POSSIBLE,

(III) THE CREW OF THE VESSEL SHALL FISH ONLY BY MEANS OF FISHING EQUIPMENT AND GEAR OF A KIND SET OUT IN THE LICENCE, AND

(IV) WHERE A QUANTITY OF GEAR AND EQUIPMENT IS SET OUT IN A LICENCE, THE CREW OF THE VESSEL SHALL NOT FISH WITH A QUANTITY OF GEAR AND EQUIPMENT THAT EXCEEDS THE QUANTITY SET OUT IN THE LICENCE;

(D) WHERE THE TRANSPORTING OF FISH FROM FISHING GROUNDS IS AUTHORIZED BY THE LICENCE

(I) ONLY THE SPECIES AND QUANTITIES OF FISH SET OUT IN THE LICENCE SHALL BE TAKEN ON BOARD THE VESSEL FOR THAT PURPOSE,

(II) THE FISH MAY BE TAKEN ON BOARD ONLY FROM VESSELS OF A CLASS SET OUT IN THE LICENCE, AND

(III) THE MASTER OF THE VESSEL SHALL CAUSE WRITTEN RECORDS TO BE MAINTAINED ON A DAILY BASIS OF THE FISH TAKEN ON BOARD THE VESSEL FOR TRANSPORTATION;

(E) THE VESSEL SHALL HAVE ON BOARD AT ALL TIMES DURING THE PERIOD IT IS IN CANADIAN FISHERIES WATERS EQUIPMENT AND GEAR, INCLUDING COMMUNICATIONS EQUIPMENT, DESCRIBED IN THE LICENCE AS "REQUIRED EQUIPMENT";

It is a condition of this licence that the registration holder/licencee sign all pages of this document.

FISHER

DATE

Canada



# REGISTRATION(S) AND/OR FISHING LICENCE(S)

This document authorizes the registration card holder and/or licence holder to engage in fishing and related activities on the Atlantic coast of Canada subject to the provisions of the Fisheries Act and Regulations made thereunder.

This licence and/or registration is issued under the authority of the Minister of Fisheries and Oceans Canada.

FIN 700020037

CALENDAR YEAR 2018  
ISSUANCE DATE: AUGUST 10, 2018

OCEARCH  
1790 BONANZA DR.  
SUITE 101  
PARK CITY UT 84060, UN

HOMEPORT  
12101 HALIFAX

Licence #	Species	Areas	Licence Type	Gear Permitted	Amr	VRN	LOA
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(F) WHERE THE MINISTER REQUESTS THE FLAG STATE OF THE VESSEL TO CARRY OUT, FROM TIME TO TIME, A PROGRAM OF SAMPLING, OBSERVATION OR RESEARCH IN CONNECTION WITH FISHERIES IN CANADIAN FISHERIES WATERS, THE MASTER SHALL COMPLY WITH INSTRUCTIONS ISSUED TO HIM BY THE AUTHORIZED OFFICIALS OF THAT FLAG STATE IN RESPECT OF THAT PROGRAM;

(G) THE MASTER OR CREW OF THE VESSEL SHALL NOT CARRY OUT ANY ACTIVITY IN ANY AREA OF CANADIAN FISHERIES WATERS THAT IS CONTRARY TO THE FISHERIES ACT OR REGULATIONS MADE UNDER THAT ACT.

1.3 THE MASTER OF A FOREIGN VESSEL IN RESPECT OF WHICH A LICENCE HAS BEEN ISSUED SHALL NOT CONTRAVENE OR FAIL TO COMPLY WITH ANY CONDITION SET OUT IN THAT LICENCE.

## 2.0 AUTHORIZED ACTIVITIES

THE ABOVE MENTIONED VESSEL, IS AUTHORIZED TO ENTER THAT PORTION OF CANADIAN FISHERIES WATERS KNOWN AS FISHING ZONES 2 AND 4 AND TO ENGAGE IN FISHING FOR THE PURPOSES OF SCIENTIFIC RESEARCH AS DESCRIBED ABOVE.

## 3.0 AUTHORIZED GEAR AND EQUIPMENT:

THE VESSEL IS AUTHORIZED TO USE ONLY THE GEAR AND EQUIPMENT THAT IS IDENTIFIED ABOVE.

## 4.0 REPORTING REQUIREMENTS

THE FOLLOWING REPORTS SHALL BE MADE VIA ONE OF THE TWO FOLLOWING METHODS:-

- VIA FAX (902) 426-8003, OR,
- VIA E-MAIL DMP-NATIONALPROGRAMS.XMAR@DFO-MPO.GC.CA

4.1 IN ACCORDANCE WITH THE COASTAL FISHERIES PROTECTION REGULATIONS THE MASTER OF THIS VESSEL SHALL:-

(A) AT LEAST 24 HOURS PRIOR TO THE ENTRY OF THIS VESSEL INTO CANADIAN FISHERIES WATERS, NOTIFY THE REGIONAL DIRECTOR-GENERAL OF THE ESTIMATED TIME OF ENTRY OF THE VESSEL INTO SUCH WATERS AND THE LOCATION OF SUCH ENTRY.

(B) AT LEAST 24 HOURS PRIOR TO THE ENTRY AND/OR DEPARTURE FROM A CANADIAN PORT THIS VESSEL SHALL NOTIFY THE REGIONAL DIRECTOR-GENERAL OF THE ESTIMATED TIME OF ENTRY AND/OR DEPARTURE OF THE VESSEL FROM SUCH PORT.

(C) AT LEASE 72 HOURS PRIOR TO THE DEPARTURE FROM CANADIAN FISHERIES WATERS, THIS VESSEL SHALL NOTIFY THE REGIONAL DIRECTOR-GENERAL OF THE ESTIMATED TIME OF DEPARTURE OF THE VESSEL FROM SUCH WATERS, AND THE LOCATION OF SUCH DEPARTURE.

COPIES OF THE ORIGINAL RESEARCH DATA COLLECTED DURING EACH TRIP MUST BE MADE AVAILABLE TO CANADIAN SCIENTISTS UPON REQUEST.

## 5.0 SPECIAL CONDITIONS

5.1 WHILE OPERATING UNDER THIS LICENCE THE VESSEL MUST COMPLY WITH ALL APPLICABLE CANADIAN LAWS AND REGULATIONS INCLUDING:

- (A) FISHERIES ACT
- (B) COASTAL FISHERIES PROTECTION ACT AND REGULATIONS
- (C) FOREIGN VESSEL FISHING REGULATIONS
- (D) FISHERY (GENERAL) REGULATIONS
- (E) EASTERN CANADA TRAFFIC ZONES REGULATIONS
- (H) SPECIES AT RISK ACT

5.2 MASTER IS TO ADHERE TO GUIDANCE CONTAINED IN CANADIAN COAST GUARD ANNUAL NOTICE TO

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FISHER

DATE

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# REGISTRATION(S) AND/OR FISHING LICENCE(S)

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Licence #	Species	Areas	Licence Type	Gear Permitted	Amt	VRN	LOA
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MARINERS: GENERAL GUIDELINES FOR MARINE MAMMAL CRITICAL AREAS (5) FOR THE GRAND MANAN WHALE SANCTUARY AND ROSEWAY BASIN AREA TO BE AVOIDED.  
WHILE IN VICINITY OF BAY OF FUNDY VESSEL TRAFFIC SERVICES ZONE, MASTER IS TO RECORD AND REPORT NORTH ATLANTIC RIGHT WHALE SIGHTINGS TO CANADIAN COAST GUARD (FUNDY TRAFFIC, CHANNEL 14). ALL WHALE RECORDS (POST VOYAGE) TO 1-844-800-8568; XMARWHALESIGHTINGS@DFO-MPO.GC.CA.  
CONTACT: PAM EMERY

5.3 KNOWN/EXPECTED CORAL CONCENTRATIONS OCCUR IN THE AREAS OF GREATER THAN 200 METRES DEPTH IN NORTHEAST CHANNEL, ALONG THE EDGES OF GEORGES BANK, AND IN THE JORDAN BASIN AREA. THESE CORALS ARE CONSIDERED IMPORTANT HABITAT AND ARE THE SUBJECT OF CONSERVATION MEASURES IN CANADIAN WATERS. CAUTION SHOULD BE TAKEN TO MINIMIZE GEAR INTERACTIONS WITH CORALS IF THEY ARE FOUND DURING THE COURSE OF OPERATIONS. (CONTACT: GLEN HERBERT; 902-426-9900; GLEN.HERBERT@DFO-MPO.GC.CA)

## 6.0 EXPLANATORY NOTES

WHERE IN THIS LICENCE A REFERENCE IS MADE TO A NAFO SUBAREA, DIVISION OR SUBDIVISION IT MEANS THAT SUBAREA, DIVISION OR SUBDIVISION DESCRIBED IN ANNEX 111 OF THE "CONVENTION ON FUTURE MULTILATERAL COOPERATION IN THE NORTHWEST ATLANTIC FISHERIES" THAT WAS RATIFIED BY CANADA ON NOVEMBER 30, 1978 AND CAME INTO FORCE ON JANUARY 1, 1979.

THE MASTER MUST SIGN TO ACKNOWLEDGE THAT HE/SHE HAS READ THESE CONDITIONS:

MASTER'S SIGNATURE \_\_\_\_\_

The use of ALL of these licence(s) is subject to any conditions which are issued by D.F.O. The licence holder must ensure that they have received the licence conditions, and may NOT conduct any fishing activity with any of these licence(s) unless in receipt of the licence conditions.

It is a condition of this licence that the registration holder/licence sign all pages of this document.

\_\_\_\_\_  
FISHER

\_\_\_\_\_  
DATE

Canada

## MacDonald, Jennifer

---

**From:** Robert Hueter <rhuetter@mote.org>  
**Sent:** September-24-18 9:42 AM  
**To:** Gromack, Aimee; MacDonald, Jennifer  
**Cc:** chris@oceanarch.org; Wambolt, Michael  
**Subject:** Re: Follow-up on SARA permit and White Shark sightings info

Yes about Cape Breton, but remember that Hilton is still there, although he moved more offshore yesterday towards the Newfoundland region. Getting you those length/girth data ASAP.

Cheers,  
Bob

**ROBERT E. HUETER, Ph.D.**  
*Senior Scientist & Director, Center for Shark Research*  
*Perry W. Gilbert Chair in Shark Research*  
*Manager, Sharks & Rays Conservation Research Program*  
*Mote Marine Laboratory*  
*1600 Ken Thompson Parkway*  
*Sarasota, FL 34236 USA*

*Chief Science Advisor, OCEARCH*

[rhuetter@mote.org](mailto:rhuetter@mote.org)  
Tel: 941-388-1827  
Fax: 941-388-4312  
More info at: [www.mote.org](http://www.mote.org)

On 9/24/2018 8:23 AM, Gromack, Aimee wrote:

Yes, thank you Bob for your follow-up email.

I would note that none of our recent sightings have occurred around Cape Breton but that could be because there is a much smaller population there compared to NS mainland. Note that most recent sightings outside the Bay of Fundy occurred between St Margaret's Bay and Yarmouth, most between the mouth of the LaHave River and the Port Mouton area. Just something to consider.

Looking forward to the girth data, thank you.

Aimee

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**From:** MacDonald, Jennifer  
**Sent:** September-24-18 8:15 AM  
**To:** Robert Hueter; Gromack, Aimee  
**Cc:** [chris@oceanarch.org](mailto:chris@oceanarch.org); Wambolt, Michael  
**Subject:** RE: Follow-up on SARA permit and White Shark sightings info

Good morning Bob,

Thanks for the follow-up below to Aimee's email.

You're find a map of fisheries zones at the following link: <http://geoportal.gc.ca/eng/Maps/Viewer/6#fc>. This should help you determine if your Foreign Vessel Licence will require an amendment.

With respect to your SARA permit; if you could specify exactly where you would like us to consider as additional areas (is it just the eastern coast of Cape Breton?), then I will work on that. If you could also let me know when you would be looking to relocate there, that would be helpful.

Regards,  
Jenn

**Jennifer MacDonald**  
Species at Risk Management Division  
(902) 407-8175

---

**From:** Robert Hueter [<mailto:rhuetter@mote.org>]  
**Sent:** September-22-18 3:28 PM  
**To:** Gromack, Aimee; MacDonald, Jennifer  
**Cc:** [chris@ocearch.org](mailto:chris@ocearch.org); Wambolt, Michael  
**Subject:** Re: Follow-up on SARA permit and White Shark sightings info

Hi again, Aimee, one more thing if you don't mind: Could you or someone else point us to a graphic online that shows the fisheries zones around Nova Scotia? Currently we're licensed to fish in zones 5ZE, 4X, 5Y (Bay of Fundy), 4W, 4VS, 4VN and 3PS. Hard to find what that applies to. Can you help? Thank you - Bob

**ROBERT E. HUETER, Ph.D.**  
*Senior Scientist & Director, Center for Shark Research*  
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Fax: 941-388-4312  
More info at: [www.mote.org](http://www.mote.org)

On 9/22/2018 10:55 AM, Robert Hueter wrote:

Hi Aimee:

Great having you and Mike on the ship. The weather's dicey today so we've held back at the dock a bit, but are heading out now.

On your points:

1- We have printed copies of all the permits in a binder now to show to any

authorities on request. The crew has read the permits before but we'll conduct a second round of review and will of course brief every new scientist coming on board during the expedition. The fishing crew will not change.

2- We've been in touch with Heather Bowlby about procedures if we should encounter her PSAT-tagged shark, and all is good.

3- On amending our permits, yes we wish to request the flexibility to fish all along the Atlantic coast of Nova Scotia, up to and including the waters around Cape Breton Island. As you know our shark Hilton has spent the last two weeks off Cape Breton. We'd be very grateful for your and Jenn's help with that amendment to our SARA permit, and also any help you can give us for amending our Foreign Vessel Licence.

4- Thank you very much for the doc that includes white shark encounters. We'll take this info into consideration in our search.

5- We're searching our database now for white sharks in the approx. 4m range and will provide you total lengths and girths for all of those. We'll also provide the sex as females could be girthier than the males at that size.

Thanks so much for your help, back to you soon, wish us luck!

Bob

**ROBERT E. HUETER, Ph.D.**

*Senior Scientist & Director, Center for Shark Research  
Perry W. Gilbert Chair in Shark Research  
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Fax: 941-388-4312

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On 9/21/2018 12:03 PM, Gromack, Aimee wrote:

Hi Bob and Chris,

It was great to meet you and the rest of the crew yesterday and thank you for your excellent hospitality. Mike and I had a great experience even though we didn't get to witness a White Shark being tagged.

I have a few items I wanted to follow up with you on:

1. **Compliance with permit requirements.** To ensure that you meet the s. 73 *Species at Risk Act* permit requirements, please:

- a. Ensure that you have a copy of the permit that is readily accessible onboard (paper would be preferred if a DFO Fishery Officer were to board your vessel – same goes for the Foreign Vessel Licence containing the *Fisheries Act* General Regulations s.52 permit).
  - b. Ensure and that all persons undertaking the activities covered by the permit (i.e., anyone that interacts with the White Shark in any way) is familiar with the conditions of the permit → this includes any new staff that arrive later.
2. As we discussed, if you see that a White Shark has a tag, please do not attempt to catch it (or release it if a tag is seen after the shark is hooked).
3. **Amendment to Permits.** Please let me know if you would like to request an amendment and I will pass your request along for action. I am looking into the Foreign Vessel Licence amendment process.
4. **Sightings information.** Please see Appendix 1 of the attached publication for a list of White Shark records in Atlantic Canada (excludes tagged shark detections). There were more sightings this year but most were in the Bay of Fundy. There was a sighting at Big Tusket Island in Southwest NS as well – copy and paste this link into your browser: <https://www.cbc.ca/news/canada/nova-scotia/watch-curious-great-white-shark-swim-alongside-boat-near-yarmouth-1.4792010>
5. **Girth measurements.** It would be great if you could provide the girth measurements you have for White Sharks that are close to 4.0 m so we can make an accurate model for display at the Bedford Institute of Oceanography. Could you provide a few girth measurements for White Sharks as close to 4 m in length as possible?

If things start to get sharky we hope to get back to the boat. I will check your twitter feed and will be in touch!

Thanks again and please don't hesitate to call if you have any questions.

Cheers,

**Aimee Gromack BSc, MMM**  
*Species at Risk Biologist*

Species at Risk Management Division | Division de la gestion des  
 espèces en péril  
 Fisheries & Oceans Canada | Pêches et Océans Canada  
 Bedford Institute of Oceanography | Institut océanographique de  
 Bedford  
 1 Challenger Dr, PO Box 1006, Stn B501 | 1 promenade Challenger, CP  
 1006, Stn B501  
 Dartmouth, NS B2Y 4A2 | Dartmouth, N-É B2Y 4A2  
[Aimee.Gromack@dfo-mpo.gc.ca](mailto:Aimee.Gromack@dfo-mpo.gc.ca)



Tel | Tél. 902-403-6277  
Fax | Télécopieur 902-426-2331

No information has been removed or severed from this page

## **MacDonald, Jennifer**

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**From:** MacDonald, Jennifer  
**Sent:** September-24-18 11:02 AM  
**To:** MacDonald, Jennifer  
**Subject:** Note to File - OCEARCH permit amendment

OCEARCH has requested an amendment in relation to the location of their permitted activities; no other changes (methodology, number of sharks to be tagged, etc.) will change.

Given no changes to activities, there is no need for reassessment of impacts (one wide ranging population, therefore previous assessment applies); therefore will be processed as a simple amendment to the location.

### **Jennifer MacDonald**

Species at Risk Biologist | Biologiste des espèces en péril  
Species at Risk Management Division | Division de la gestion des espèces en péril  
Ecosystem Management | Gestion des écosystèmes  
Fisheries & Oceans Canada | Pêches & Océans Canada  
P.O. Box 1006 Dartmouth N.S. | C.P. 1006 Dartmouth N.E. B2Y 4A2  
Tel | Tél: (902) 407-8175 Fax | Téléc: (902) 426-2331  
Email | Courriel: [jennifer.macdonald@dfo-mpo.gc.ca](mailto:jennifer.macdonald@dfo-mpo.gc.ca)

## MacDonald, Jennifer

---

**From:** Robert Hueter <rhuetter@mote.org>  
**Sent:** September-24-18 11:42 AM  
**To:** MacDonald, Jennifer; Gromack, Aimee  
**Cc:** chris@oceanarch.org; Wambolt, Michael  
**Subject:** Re: Follow-up on SARA permit and White Shark sightings info

**Categories:** To file

That's fine, thank you Jenn, Meat Cove was just for reference. We probably would not range too much farther beyond the Sydney area, if we go up there. Thanks again for all your help.

Bob

**ROBERT E. HUETER, Ph.D.**

*Senior Scientist & Director, Center for Shark Research  
Perry W. Gilbert Chair in Shark Research  
Manager, Sharks & Rays Conservation Research Program  
Mote Marine Laboratory  
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More info at: [www.mote.org](http://www.mote.org)

On 9/24/2018 10:37 AM, MacDonald, Jennifer wrote:

Hi Bob,

Aimee touched base with the licencing office at DFO that coordinates the Foreign Vessel Clearance licences, and they confirmed that you are permitted to conduct your fishing activities with the areas listed in the Location of Fishing Activity listed on the licence. The Licencing Office also indicated that according to the current Location of Fishing Activity, your vessel is licenced to conduct activity in the waters off the coast of Cape Breton; excluding the Gulf side of Cape Breton. The licence does not authorize activity in Gulf Region area (this is a link to a map showing the boundary between the Maritimes and Gulf Regions of DFO: <http://www.glf.dfo-mpo.gc.ca/Gulf/Map-Gulf-Region>).

I do not know a lot about the Foreign Vessel Clearance process, so you may have to contact the Licencing Office to ask about this portion, but note that the only Port of Call listed on your licence is Halifax. The contact information for the Maritimes Region licencing office is [RegionalLicensing.XMAR@dfo-mpo.gc.ca](mailto:RegionalLicensing.XMAR@dfo-mpo.gc.ca) should you need to enquire about the Ports of Call.

With respect to the SARA permit, I will draft the amendment. Please note, that I believe Meat Cove would actually be considered to be within DFO's Gulf Region and your SARA permit does not apply outside the Maritime Region of DFO (again refer to map link above); I will draft the amendment to apply to the extent of the Maritimes Region area within Cape Breton (which comes quite close to Meat Cove).

Jenn

**Jennifer MacDonald**

Species at Risk Management Division  
(902) 407-8175

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**From:** Robert Hueter [<mailto:rhoeter@mote.org>]  
**Sent:** September-24-18 9:36 AM  
**To:** MacDonald, Jennifer; Gromack, Aimee  
**Cc:** [chris@ocearch.org](mailto:chris@ocearch.org); Wambolt, Michael  
**Subject:** Re: Follow-up on SARA permit and White Shark sightings info

Good morning Jenn:

Thanks for that website, very helpful. So it looks like we're already licensed to fish all the way from the Bay of Fundy around the entire Atlantic coast of Nova Scotia to the northern tip of Cape Breton, because our fishing license (attached) lists these zones: 5ZE, 4X, 5Y, 4W, 4VS, 4VN and 3PS. We're not licensed to fish on the west side of Cape Breton (4T) but I don't think we're looking to go that far. So it appears we're good to go on the fishing side. We just need a SARA permit amendment to go as far north as Meat Cove on Cape Breton. As to when, hard to say... we've moved a bit south of our previous location and are now going to fish near West Ironbound Island, to get out of the wind. Cape Breton wouldn't be for at least another few days or a week, if ever. Our fishing is scheduled to end Oct 10. So if you could please amend our SARA permit to allow this flexibility, that would be great.

By the way, yesterday we had a large white shark briefly around our ship north of Cross Island. Just checking us out but did not take any of our baits. The fishing continues... they're here, no question. Just hope we can get a few before the weather curtails us.

Cheers,  
Bob

**ROBERT E. HUETER, Ph.D.**

*Senior Scientist & Director, Center for Shark Research  
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More info at: [www.mote.org](http://www.mote.org)

On 9/24/2018 7:15 AM, MacDonald, Jennifer wrote:

Good morning Bob,

Thanks for the follow-up below to Aimee's email.

You're find a map of fisheries zones at the following link:  
<http://geoportal.gc.ca/eng/Maps/Viewer/6#fc>. This should help you determine if your Foreign Vessel Licence will require an amendment.

With respect to your SARA permit; if you could specify exactly where you would like us to consider as additional areas (is it just the eastern coast of Cape Breton?), then I will work on that. If you could also let me know when you would be looking to relocate there, that would be helpful.

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On 9/22/2018 10:55 AM, Robert Hueter wrote:

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On your points:

1- We have printed copies of all the permits in a binder now to

show to any authorities on request. The crew has read the permits before but we'll conduct a second round of review and will of course brief every new scientist coming on board during the expedition. The fishing crew will not change.

2- We've been in touch with Heather Bowlby about procedures if we should encounter her PSAT-tagged shark, and all is good.

3- On amending our permits, yes we wish to request the flexibility to fish all along the Atlantic coast of Nova Scotia, up to and including the waters around Cape Breton Island. As you know our shark Hilton has spent the last two weeks off Cape Breton. We'd be very grateful for your and Jenn's help with that amendment to our SARA permit, and also any help you can give us for amending our Foreign Vessel Licence.

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Thanks so much for your help, back to you soon, wish us luck!

Bob

**ROBERT E. HUETER, Ph.D.**

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On 9/21/2018 12:03 PM, Gromack, Aimee wrote:

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1. **Compliance with permit requirements.** To ensure that you meet the s. 73 *Species at Risk* Act permit requirements, please:
  - a. Ensure that you have a copy of the permit that is readily accessible onboard (paper would be preferred if a DFO Fishery Officer were to board your vessel – same goes for the Foreign Vessel Licence containing the *Fisheries Act* General Regulations s.52 permit).
  - b. Ensure and that all persons undertaking the activities covered by the permit (i.e., anyone that interacts with the White Shark in any way) is familiar with the conditions of the permit → this includes any new staff that arrive later.
2. As we discussed, if you see that a White Shark has a tag, please do not attempt to catch it (or release it if a tag is seen after the shark is hooked).
3. **Amendment to Permits.** Please let me know if you would like to request an amendment and I will pass your request along for action. I am looking into the Foreign Vessel Licence amendment process.
4. **Sightings information.** Please see Appendix 1 of the attached publication for a list of White Shark records in Atlantic Canada (excludes tagged shark detections). There were more sightings this year but most were in the Bay of Fundy. There was a sighting at Big Tusket Island in Southwest NS as well – copy and paste this link into your browser: <https://www.cbc.ca/news/canada/nova-scotia/watch-curious-great-white-shark-swim-alongside-boat-near-yarmouth-1.4792010>
5. **Girth measurements.** It would be great if you could provide the girth measurements you have for White Sharks that are close to 4.0 m so we can make an accurate model for display at the Bedford Institute of Oceanography. Could you provide a few girth measurements for White Sharks as close to 4 m in length as possible?

If things start to get sharky we hope to get back to the boat. I will check your twitter feed and will be in touch!

Thanks again and please don't hesitate to call if you have any questions.

Cheers,

**Aimee Gromack BSc, MMM**  
*Species at Risk Biologist*

Species at Risk Management Division | Division de la  
gestion des espèces en péril  
Fisheries & Oceans Canada | Pêches et Océans Canada  
Bedford Institute of Oceanography | Institut  
océanographique de Bedford  
1 Challenger Dr, PO Box 1006, Stn B501 | 1 promenade  
Challenger, CP 1006, Stn B501  
Dartmouth, NS B2Y 4A2 | Dartmouth, N-É B2Y 4A2  
[Aimee.Gromack@dfo-mpo.gc.ca](mailto:Aimee.Gromack@dfo-mpo.gc.ca)  
Tel | Tél. 902-403-6277  
Fax | Télécopieur 902-426-2331



## **MacDonald, Jennifer**

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**From:** Schaefer, Heidi  
**Sent:** September-25-18 2:59 PM  
**To:** MacDonald, Jennifer  
**Subject:** RE: OCEARCH permit amendment

Makes sense. Thanks.

**From:** MacDonald, Jennifer  
**Sent:** Tuesday, September 25, 2018 1:10 PM  
**To:** Schaefer, Heidi <[Heidi.Schaefer@dfo-mpo.gc.ca](mailto:Heidi.Schaefer@dfo-mpo.gc.ca)>  
**Subject:** RE: OCEARCH permit amendment

Hi Heidi,

Just to loop you in, Donald asked for one additional amendment to the permit. In condition 2.15, the original permit read: "Only white sharks greater than 3.5 metres in total length shall be caught and tagged"

The rationale for this condition was that there is a study that showed tagging juveniles could impact fin development (i.e., having a SPOT tag bolted to the fin could affect growth and development). However, the way the condition was originally worded, limited both the capture and tag attachment to sharks of a certain size. Given that the condition was meant to prevent impacts to a juvenile's fin development from a SPOT tag, that it is difficult to estimate the length of a shark before it is caught, and that, if hooked, the shark must be brought onto the platform to remove the hook, Donald suggested that prohibiting the capture of sharks smaller than 3.5 m was not required.

The amended condition reads: "Only White Sharks greater than 3.5 metres in total length shall be tagged."

I've made this change and printed it again for Donald's signature.

Jenn

**Jennifer MacDonald**  
Species at Risk Management Division  
(902) 407-8175

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**From:** Schaefer, Heidi  
**Sent:** September-25-18 11:41 AM  
**To:** MacDonald, Jennifer  
**Subject:** RE: OCEARCH permit amendment

Perfect. Thanks. Consider approved from my perspective.

**From:** MacDonald, Jennifer  
**Sent:** Tuesday, September 25, 2018 11:14 AM  
**To:** Schaefer, Heidi <[Heidi.Schaefer@dfo-mpo.gc.ca](mailto:Heidi.Schaefer@dfo-mpo.gc.ca)>  
**Subject:** RE: OCEARCH permit amendment

Yes, their foreign vessel licence was more broad already. We confirmed this with Licencing.  
Jenn

**Jennifer MacDonald**  
Species at Risk Management Division  
(902) 407-8175

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**From:** Schaefer, Heidi  
**Sent:** September-25-18 11:13 AM  
**To:** MacDonald, Jennifer  
**Subject:** RE: OCEARCH permit amendment

Ok. That makes more sense to me. I assume that is still fine re: the Foreign Vessel License?

**From:** MacDonald, Jennifer  
**Sent:** Tuesday, September 25, 2018 11:09 AM  
**To:** Schaefer, Heidi <[Heidi.Schaefer@dfo-mpo.gc.ca](mailto:Heidi.Schaefer@dfo-mpo.gc.ca)>  
**Subject:** RE: OCEARCH permit amendment

Sure, we could do. It was initially more specific b/c they requested just specific locations, but I will change it to be the whole region.

Thanks,  
Jenn

**Jennifer MacDonald**  
Species at Risk Management Division  
(902) 407-8175

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**From:** Schaefer, Heidi  
**Sent:** September-25-18 11:09 AM  
**To:** MacDonald, Jennifer  
**Subject:** RE: OCEARCH permit amendment

Hi Jenn,  
Is there a reason we wouldn't just make the location: Within the Maritimes Region of Fisheries and Oceans Canada? We have done that for many other marine species permits.

Heidi

**From:** MacDonald, Jennifer  
**Sent:** Tuesday, September 25, 2018 9:12 AM  
**To:** Schaefer, Heidi <[Heidi.Schaefer@dfo-mpo.gc.ca](mailto:Heidi.Schaefer@dfo-mpo.gc.ca)>  
**Subject:** OCEARCH permit amendment

Hi Heidi,

OCEARCH requested an amendment to their permit, with respect to the locations in which they are able to tag (they would like to be able to possibly go up to Cape Breton).

Their current permit lists: Mahone Bay, Bay of Fundy and the area around Sable Island (on page 1 under "Location of Activity"). The study area in the section "Description of Activity" was described more broadly as Mahone Bay, Bay of Fundy, Scotian Shelf.

I have amended the permit here: R:\Oceans & Habitat\Species at Risk\Permitting\1-Permits\2017\17-WS-Fischer-Ocearch\4 PERMIT\Amendment - location

I only changed the locations list on page 1, as the description in the description of the activity was already more broad.

If you are ok with the way this is described, I will try to find a printer so that we can get this printed for Donald's signature.

Thanks,  
Jenn

**Jennifer MacDonald**

Species at Risk Biologist | Biologiste des espèces en péril  
Species at Risk Management Division | Division de la gestion des espèces en péril  
Ecosystem Management | Gestion des écosystèmes  
Fisheries & Oceans Canada | Pêches & Océans Canada  
P.O. Box 1006 Dartmouth N.S. | C.P. 1006 Dartmouth N.E. B2Y 4A2  
Tel | Tél: (902) 407-8175 Fax | Téléc: (902) 426-2331  
Email | Courriel: [jennifer.macdonald@dfo-mpo.gc.ca](mailto:jennifer.macdonald@dfo-mpo.gc.ca)

## MacDonald, Jennifer

---

**From:** MacDonald, Jennifer  
**Sent:** September-26-18 8:28 AM  
**To:** chris@oceansearch.org; 'Robert Hueter'  
**Cc:** Gromack, Aimee  
**Subject:** SARA Permit (207-17a) - amendment  
**Attachments:** SARA-Permit-2017-07(OCEARCH)-Amendment.pdf

Hello Bob and Chris,

I have attached the amendment to your *Species at Risk Act* Section 73 Permit as requested. The Location of Proposed Activity (page 1) has been amended to include all of the waters within the Maritimes Region of DFO. Note, that we also slightly modified condition 2.15. The condition still limits the size of sharks that may be tagged, but removed the condition in relation to capture of sharks only above a certain size. This was in recognition of the difficulty in accurately determining the size of a shark before it is caught.

As with the original permit, you should keep a printed copy of the signed permit onboard at all times and ensure all members of the research team are familiar with all of the conditions of the permit.

Thank you,  
Jenn

**Jennifer MacDonald**

Species at Risk Biologist | Biologiste des espèces en péril  
Species at Risk Management Division | Division de la gestion des espèces en péril  
Ecosystem Management | Gestion des écosystèmes  
Fisheries & Oceans Canada | Pêches & Océans Canada  
P.O. Box 1006 Dartmouth N.S. | C.P. 1006 Dartmouth N.E. B2Y 4A2  
Tel | Tél: (902) 407-8175 Fax | Téléc: (902) 426-2331  
Email | Courriel: [jennifer.macdonald@dfo-mpo.gc.ca](mailto:jennifer.macdonald@dfo-mpo.gc.ca)



Fisheries and Oceans Canada  
Pêches et Océans Canada

SARA Permit No: DFO-MAR-2017-17a

## PERMIT ISSUED UNDER SECTION 73 OF THE *SPECIES AT RISK ACT*

Subject to the conditions described in this permit, the holder of this permit ("Permit Holder"), or any qualified person acting under the authority of the Permit Holder, is authorized under the authority of subsection 73(1) of the *Species at Risk Act*, S.C. 2002, c.29 (SARA) to engage in activities (as described in this permit) that **harm, harass, capture, and possess** individuals of the following threatened or endangered aquatic species listed on Schedule 1 of SARA:

**White Shark** (*Carcharodon carcharias*), Atlantic population

### Permit issued to:

Name: OCEARCH ("Permit Holder")  
Attention to: George Christopher Fischer  
Address: 1790 Bonanza Drive, Suite 101B  
Park City, Utah, USA 84060  
Email: [chris@oceanarch.org](mailto:chris@oceanarch.org)  
Phone: (435) 645-8990 (office) [REDACTED] (cellular)

The following individual operating under the authority of OCEARCH as "Permit Holder", and those under his supervision, may undertake the activities authorized by this permit:

Name	Organization
Robert Hueter	Mote Marine Laboratory

### Location of Proposed Activity

This permit is only valid at the following location(s):

Nearest community (city, town, village): N/A

Municipality, district, township, county: N/A

Province: N/A

Name of watercourse(s), waterbody(ies): **Atlantic Ocean**

Specific location: **Within the Maritimes Region of Fisheries and Oceans Canada**

### Valid Permit Period

This permit is valid from **August 1, 2018** until **November 30, 2018**

The permit was modified on **September 25, 2018**.

If the Permit Holder cannot complete the activity during this period, Fisheries and Oceans Canada (DFO) must be notified in advance of the expiration of the time period, as soon as the Permit Holder is aware.

The period during which other conditions of this permit must be complied with are provided in their respective sections below. DFO may, where appropriate, amend this permit. In cases where the Valid Permit Period is extended, written notice and/or an amended permit will be provided to the Permit Holder.

Canada

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### **Description of the Activity**

The purpose of the activity is to conduct scientific research on White Sharks in Canadian waters to gain a better understanding of the role of Canadian waters in the life history of the White Shark population in the northwest Atlantic Ocean, the range of the species within Canadian waters and health of White Sharks. The researchers will attach acoustic and satellite tags, as well as collect various biological samples, from up to 20 sharks in Canadian waters.

The study area includes:

- Mahone Bay;
- Bay of Fundy; and
- Scotian Shelf.

Researchers will use chum to attract White Sharks in the study area to the fishing boat and larger research vessel. When a White Shark is sighted, either visually or using a drone, the fishing boat will target its fishing activities to attract and capture that shark. Chum bags, chum boxes, bait tanks, chum tubes and decoys may all be used to attract White Sharks to the fishing vessel. Once a White Shark is in the vicinity of the fishing vessel, the researchers will attempt to catch the shark using a 20/0 circle hook (zero offset) with a bite-blocker attached. In the case of a very large White Shark, a 27/0 circle hook (zero offset) with a buoy to prevent swallowing of the hook will be used. Once caught, the White Shark will be guided onboard the hydraulic lift on the research vessel, which will then be raised above the waterline. While on the lift, sharks will be provided with oxygenated seawater via a mouthpiece and tube.

Once on the lift, internal acoustic tags will be implanted surgically in the coelomic cavity and the incision will be sutured. Smart Position and Temperature (SPOT) tags will be attached on the leading edge of the first dorsal fin by drilling four holes in the dorsal fin with an electric drill and attaching the tag with nylon bolts, stainless steel locknuts and plastic spacers. The hardware is designed to retain the tag for five years after which it will fall and the tag will detach. All White Sharks caught, up to 20, will have both acoustic and SPOT tags applied. Pop-up Archival Satellite Tags (PSAT) will be attached via a tether to a subdermal metal dart implanted in the shark's flank below the first dorsal fin. PSAT tags will be attached to up to 6 White Sharks caught.

The researchers will also collect samples (blood, muscle, semen, fecal and urine samples), conduct skin, gill and cloacal swabs, collect parasites, collect eye and tail measurements, and perform an ultrasound (females). Samples will be collected using a hypodermic puncture and biopsy punch.

The activities authorized by this permit consist of:

- Actively attracting White Sharks to a vessel;
- Catch and release of White Sharks;
- Lifting individuals out of the water on a hydraulic lift;
- Collecting blood and tissue samples;
- Implanting internal acoustic tags; and
- Attaching SPOT and PSAT tags.

The effects that the activity may cause to the listed wildlife species and the effects of those changes authorized by this permit are as follows:

- Harm, harassment, capture and possession of listed aquatic species at risk.

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## Terms and Conditions of Permit

The activity must be carried on in accordance with the following conditions:

### 1. General Conditions

- 1.1. A copy of this permit shall be kept on site at all times in the possession of the Permit Holder or a person acting under the Permit Holder's authority, and shall be made available to an enforcement officer upon request.
- 1.2. All persons undertaking the activity under the authority of the Permit Holder shall do so under the direction and oversight of the Permit Holder and shall be made familiar with the conditions of this permit.
- 1.3. The activity must comply with the conditions identified within this permit. Activities that affect individuals of species at risk, their residences, or their critical habitat, other than those specifically identified within this permit are not authorized under this permit.
- 1.4. No changes to the Permitted activities shall take place without prior consultation with DFO, and written approval from DFO, Species at Risk Management Division. Contact information as follows:

**Species at Risk Management Division**  
**Fisheries and Oceans Canada**  
**P.O. Box 1006**  
**Dartmouth, NS, B2Y 4A2**  
**email: [SpeciesatRisk.xmar@dfo-mpo.gc.ca](mailto:SpeciesatRisk.xmar@dfo-mpo.gc.ca)**  
**phone: 1-866-891-0771 fax: 1-902-426-2331**

### 2. Conditions to avoid or minimize the impact of the activity on the species:

- 2.1. To the extent possible, activities shall be conducted in a manner whereby any individuals of the species shall be handled only in the circumstances authorized under this permit and with the least amount of harm.
- 2.2. Activities shall only be conducted in the study area described above. If activities are to be conducted outside the study area, DFO shall be notified in advance using the contact information in condition 1.4.
- 2.3. Only individuals that are experienced in tagging large pelagic fishes shall tag White Sharks.
- 2.4. White Sharks shall not be chased by the vessel.
- 2.5. The following gear shall be used: circle hooks (either 20/0 or 27/0 with zero offset) rigged with a cross bar bit-blocker (30cm up the leader) and attached to a stainless steel wire rope (3/32" or 1/8"). The leader shall be 10m in length and shall be attached to a braid rope with elasticity properties. Leaders shall be embedded inside a three-strand rope to increase the diameter.
- 2.6. Individual White Sharks shall not be kept on the research platform for longer than 20 minutes.
- 2.7. While on the research platform, oxygenated seawater shall be pumped through a hose and mouthpiece into the shark's buccal cavity at all times.
- 2.8. While on the research platform, a tail rope shall be used to prevent the animal from causing harm to itself and others.
- 2.9. While on the research platform, the animal's head and eyes shall be covered with wet towel to reduce animal stress and keep eyes moist.
- 2.10. While on the research platform, the animal's skin shall be kept wet.
- 2.11. While on the research platform animal stress shall be monitored by observing skin colouration, presence of blood pooling, gill movements, and animal activity. If acute stress is observed, the animal shall be released immediately.
- 2.12. The total time of engagement with a single White Shark from the time it is initially hooked until it is released shall be limited to 40 minutes.
- 2.13. No more than 20 White Sharks, in total, shall be tagged.
- 2.14. No attempts shall be made to tag White Sharks that are injured or behaving abnormally.
- 2.15. Only White Sharks greater than 3.5 metres in total length shall be tagged.
- 2.16. A DFO representative shall be onboard as an observer during a subset of the expedition to be

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.../4

determined by DFO.

- 2.17. In the event of a mortality or significant injury being sustained by a White Shark during a tagging attempt, all further attempts at tagging shall cease and DFO shall be contacted immediately using the contact information in condition 1.4. No further attempts at catching or tagging White Sharks shall be resumed until approved by DFO.

**3. Conditions that relate to monitoring and reporting:**

- 3.1. By December 31st, 2018, irrespective of whether the Permitted activities took place, a SARA Section 73 Permit Report shall be completed and returned to the Species at Risk Management Division using the contact information provided in condition 1.4. Without limiting the generality of the foregoing, the report shall contain the following information, to the satisfaction of DFO in its sole discretion:
- 3.1.1. to demonstrate that measures and standards to avoid and mitigate the impacts of the permitted activities on the species were implemented according to the conditions of this permit;
  - 3.1.2. an assessment of whether the measures and standards mentioned in condition 3.1.1 were successful at avoiding and mitigating the impacts of the permitted activities on the species;
  - 3.1.3. details of any contingency measures that were followed to prevent impacts greater than those authorized by this permit;
  - 3.1.4. for any interaction with, or sighting of, a White Shark, report the following: date, time, location, length, size, gender (specify if females are pregnant or not), condition of the individual; and identify if tagging was attempted or undertaken on that individual; and
  - 3.1.5. provide details of any tagging attempts, including whether tagging was successful, unplanned or unexpected impacts on the shark, reaction of the shark to the tagging, and lessons learned.

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**Authorization Limitations and Application Conditions**

This permit cannot be transferred or assigned to another party. If the activity authorized under this permit is sold or transferred to another party, or if other circumstances arise that result in another party taking over the activity, the Permit Holder shall advise DFO in advance if the ownership or responsibility for the activity is expected to change.

The failure to comply with any condition of this permit is an offence under section 97 of SARA and might result in charges being laid under SARA.

This permit may be revoked or amended to ensure the survival or recovery of White Shark. Without limiting the generality of the foregoing, DFO may:

- suspend any permitted activities to avoid or mitigate additional adverse direct or indirect effects to White Sharks;
- amend or revoke this permit; and
- direct the Permit Holder to carry out at the Permit Holder's expense any modifications or actions deemed necessary by DFO to avoid or mitigate existing impacts or to avoid further adverse direct and indirect impacts to White Sharks.

This permit is valid only with activities and species listed herein and for no other purposes. It does not authorize the Permit Holder to kill, buy, sell, or trade an individual of a wildlife species that is listed as extirpated, endangered or threatened, or any part or derivative of such an individual. This permit does not purport to release the Permit Holder from any obligation to obtain permission from or to comply with the requirements of any other regulatory agencies.



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Date of Issue: April 30, 2018

Date of Amendment: **SEP 25 2018**

Signature of authorizing officer: 

Donald Humphrey  
Manager, Species at Risk Management Division  
Maritimes Region  
Fisheries and Oceans Canada  
1 Challenger Drive, P.O. Box 1006, Dartmouth, NS, B2Y 4A2

Further information about this permit is available from the above authorizing officer ([Donald.Humphrey@dfo-mpo.gc.ca](mailto:Donald.Humphrey@dfo-mpo.gc.ca)).

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**MacDonald, Jennifer**

**From:** Robert Hueter <rhuetter@mote.org>  
**Sent:** September-26-18 12:11 PM  
**To:** MacDonald, Jennifer; chris@oceanarch.org  
**Cc:** Gromack, Aimee  
**Subject:** Re: SARA Permit (207-17a) - amendment

**Follow Up Flag:** Follow up  
**Flag Status:** Flagged

Hi Jenn:

Thank you for this amendment, very much appreciate the quick turnaround on this. We're tied up at the dock in Lunenburg today with the weather coming through, but tomorrow afternoon and beyond are looking good, so we'll be back at it soon.

I just called your office and left you a voicemail. You can call me back at [REDACTED] We have a question about our permit to tag as it relates to shark size. On page 2 of the SARA permit it states that, "All White Sharks caught, up to 20, will have both acoustic and SPOT tags applied." We've taken this as a directive to tag as many white sharks as possible here, up to 20, to maximize the data and learning from Canadian shark movement. As I think you know, in U.S. waters we've tagged everything from young-of-the-year (YOYs) to mature adults, with excellent results from their SPOT tags to fill in gaps in our knowledge of white shark life history. The two males we've tagged here so far had contour lengths and stretch total lengths of >3.5m, with total lengths just a bit under that mark. Can you provide the rationale for the 3.5m TL condition, so that we can understand what the concern there is? Please understand we do have a smaller version of the SPOT onboard to use on the very young animals -- we used this with our YOY studies off Long Island, NY. But we've found that the older juveniles through adults all tolerate the larger SPOT tag very well, and give us excellent data. I'm sure that DFO and COSEWIC wants data on all size classes of white sharks in Canadian waters, correct?

Please call me back as soon as possible, hopefully today while we're weather-bound, so that we can discuss this. We'd also like to fill you in on our exciting results with sharks Nova and Jefferson, and the sighting of another white shark earlier in the expedition. We love it here and everyone has been so welcoming!

Cheers,  
 Bob

**ROBERT E. HUETER, Ph.D.**

Senior Scientist & Director, Center for Shark Research  
 Perry W. Gilbert Chair in Shark Research  
 Manager, Sharks & Rays Conservation Research Program  
 Mote Marine Laboratory  
 1600 Ken Thompson Parkway  
 Sarasota, FL 34236 USA

Chief Science Advisor, OCEARCH

rhuetter@mote.org  
 Tel: 941-388-1827  
 Fax: 941-388-4312  
 More info at: [www.mote.org](http://www.mote.org)

*Discussed w/ Aimee + Heidi  
 (Sept. 26). \* not feasible to consider  
 these in such short notice.  
 -advise you to thoroughly  
 review & resolve this  
 in advance.  
 \* no new information to consider  
 - we could amend again to  
 clarify that it is just  
 SPOT tags (OK to put PSAT  
 + acoustics).*

On 9/26/2018 7:27 AM, MacDonald, Jennifer wrote:

Hello Bob and Chris,

I have attached the amendment to your *Species at Risk Act* Section 73 Permit as requested. The Location of Proposed Activity (page 1) has been amended to include all of the waters within the Maritimes Region of DFO. Note, that we also slightly modified condition 2.15. The condition still limits the size of sharks that may be tagged, but removed the condition in relation to capture of sharks only above a certain size. This was in recognition of the difficulty in accurately determining the size of a shark before it is caught.

As with the original permit, you should keep a printed copy of the signed permit onboard at all times and ensure all members of the research team are familiar with all of the conditions of the permit.

Thank you,  
Jenn

**Jennifer MacDonald**

Species at Risk Biologist | Biologiste des espèces en péril

Species at Risk Management Division | Division de la gestion des espèces en péril

Ecosystem Management | Gestion des écosystèmes

Fisheries & Oceans Canada | Pêches & Océans Canada

P.O. Box 1006 Dartmouth N.S. | C.P. 1006 Dartmouth N.E. B2Y 4A2

Tel | Tél: (902) 407-8175 Fax | Téléc: (902) 426-2331

Email | Courriel: [jennifer.macdonald@dfo-mpo.gc.ca](mailto:jennifer.macdonald@dfo-mpo.gc.ca)

Sept. 27.

Met w/ Heather, Warren + Annee

\* Pacific (Takeda) paper - low end was 3.1m.

\* Astro (2009) - females 4.5m.

\* Skomal + Lisa? paper - males 3.5m.  
(lower limit)

⇒ size ranges of maturity.

⇒ provide data to support claims.

⇒ @ sexual maturity, growth slows, but are indeterminate growers.

- published data does not support assertion that animals are sexually mature @ 2.8m.<sup>2</sup>

⇒ paper

Fishers - measured through survival but doesn't account for water it affected growth, pupping, etc.

\* calcifer index of claspers

→ indicator of maturity, but not conclusive.

→ would need to look @ sperm in lab to determine for sure.

→ females - can only determine maturity if killed.

⇒ Best analysis is published size info → size maturity

## MacDonald, Jennifer

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**From:** MacDonald, Jennifer  
**Sent:** September-26-18 3:21 PM  
**To:** Humphrey, Donald  
**Cc:** Gromack, Aimee; Schaefer, Heidi  
**Subject:** RE: SARA Permit (207-17a) - amendment

Thanks Donald – I will remove the last sentence and send.  
Jenn

**Jennifer MacDonald**  
Species at Risk Management Division  
(902) 407-8175

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**From:** Humphrey, Donald  
**Sent:** September-26-18 3:04 PM  
**To:** MacDonald, Jennifer  
**Cc:** Gromack, Aimee; Schaefer, Heidi  
**Subject:** RE: SARA Permit (207-17a) - amendment

Looks good, although I would suggest removing or modifying the last sentence. Please respond.

Thanks, Donald

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**From:** MacDonald, Jennifer  
**Sent:** September-26-18 2:28 PM  
**To:** Humphrey, Donald  
**Cc:** Gromack, Aimee; Schaefer, Heidi  
**Subject:** RE: SARA Permit (207-17a) - amendment

Hi Donald,

Heidi, Aimee and I discussed and do not recommend that we change their condition with respect to the minimum size for a number of reasons. The rationale for limiting the size (possible impacts on fin development to juveniles from SPOT tags) has not changed since our original evaluation; without requesting further supporting data/information from OCEARCH to re-evaluate this condition, the condition was set based on the advice of Science and the best information we had available. Heidi flagged the concern that this is the type of re-evaluation that should have been requested by OCEARCH before they started their expedition, which could have allowed us time to review it and still do our due diligence; however, we cannot dedicate time to properly re-evaluate it (nor do we have new information on which to base a new evaluation) in the next day or two.

I have drafted the email below to respond to OCEARCH for your input, please let me know if you have changes and whether you think it best for you to send or whether I should send it directly.

Thanks!  
Jenn

\*\*\*\*\*

Hi Bob,

In response to your email below, I want to clarify your interpretation of the statement "all White Sharks caught, up to 20, will have both acoustic and SPOT tags applied." This statement is included in the "Description of the Activity" section of your permit and is not to be interpreted as a directive from DFO to tag as many sharks as possible. This section of the permit is simply meant to outline the proposed activities, including specifics about how they may be carried out. This statement simply indicates that you requested to apply both types of tags on the same individuals, up to 20 sharks.

With respect to the condition placed on the total length for tagging, this was based on the best available science we had when we reviewed your application, including scientific advice that SPOT tags in particular may affect fin development in juveniles. Further, the condition to limit the size of sharks that can be tagged was consistent with your own permit request, which indicated that you were requesting to "sample up to 20 large animals in Canadian waters." In the information you submitted to our office on January 31<sup>st</sup>, you indicated that the power analysis you have completed indicated that a sample size of 60 individuals is required for the various studies you are undertaking globally (20 young-of-the-year (YOY), 20 immature and 20 mature individuals); you further indicated that you did not require additional tags on any YOY and that the Canadian expedition would be targeting large individuals.

All the permit conditions were determined based on the best available science we had at the time. It is not feasible to consider changing these on such short notice; to make changes would require further review, which could take several weeks.

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Thank you,

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**From:** Humphrey, Donald  
**Sent:** September-26-18 12:52 PM  
**To:** MacDonald, Jennifer; Schaefer, Heidi  
**Cc:** Gromack, Aimee  
**Subject:** RE: SARA Permit (207-17a) - amendment

Hi Jenn, we discussed this yesterday a bit. Please discuss and then provide me with a recommendation based on what you come up with. May require reaching out to Warren.

Thanks, Donald

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**From:** MacDonald, Jennifer  
**Sent:** September-26-18 12:20 PM  
**To:** Humphrey, Donald; Schaefer, Heidi  
**Cc:** Gromack, Aimee  
**Subject:** FW: SARA Permit (207-17a) - amendment

Hi,

Can we discuss the message below before I call Bob Hueter back? As we discussed yesterday, we did not change the size limits in the conditions and I do not think that we want to do so, however, before I talk to OCEARCH, I wondered if we should discuss again?

Thanks,  
Jenn

**Jennifer MacDonald**  
Species at Risk Management Division  
(902) 407-8175

---

**From:** Robert Hueter [mailto:rhueter@mote.org]  
**Sent:** September-26-18 12:11 PM  
**To:** MacDonald, Jennifer; chris@oearch.org  
**Cc:** Gromack, Aimee  
**Subject:** Re: SARA Permit (207-17a) - amendment

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I just called your office and left you a voicemail. You can call me back at [REDACTED] We have a question about our permit to tag as it relates to shark size. On page 2 of the SARA permit it states that, "All White Sharks caught, up to 20, will have both acoustic and SPOT tags applied." We've taken this as a directive to tag as many white sharks as possible here, up to 20, to maximize the data and learning from Canadian shark movement. As I think you know, in U.S. waters we've tagged everything from young-of-the-year (YOYs) to mature adults, with excellent results from their SPOT tags to fill in gaps in our knowledge of white shark life history. The two males we've tagged here so far had contour lengths and stretch total lengths of >3.5m, with total lengths just a bit under that mark. Can you provide the rationale for the 3.5m TL condition, so that we can understand what the concern there is? Please understand we do have a smaller version of the SPOT onboard to use on the very young animals -- we used this with our YOY studies off Long Island, NY. But we've found that the older juveniles through adults all tolerate the larger SPOT tag very well, and give us excellent data. I'm sure that DFO and COSEWIC wants data on all size classes of white sharks in Canadian waters, correct?

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Cheers,  
Bob

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*Senior Scientist & Director, Center for Shark Research*  
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On 9/26/2018 7:27 AM, MacDonald, Jennifer wrote:

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As with the original permit, you should keep a printed copy of the signed permit onboard at all times and ensure all members of the research team are familiar with all of the conditions of the permit.

Thank you,  
Jenn

**Jennifer MacDonald**

Species at Risk Biologist | Biologiste des espèces en péril  
Species at Risk Management Division | Division de la gestion des espèces en péril  
Ecosystem Management | Gestion des écosystèmes  
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Tel | Tél: (902) 407-8175 Fax | Téléc: (902) 426-2331  
Email | Courriel: [jennifer.macdonald@dfo-mpo.gc.ca](mailto:jennifer.macdonald@dfo-mpo.gc.ca)

## MacDonald, Jennifer

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**From:** Chris Fischer <chris@oearch.org>  
**Sent:** September-26-18 4:22 PM  
**To:** MacDonald, Jennifer; Humphrey, Donald  
**Cc:** Robert Hueter; Gromack, Aimee  
**Subject:** Re: SARA Permit (207-17a) - amendment

Jennifer,

I'm a little confused.

Our objective here in Canada has always been to tag mature animals which is in sync with your comments regarding the fin.

It's just that we regularly see sexually mature white sharks as small as 2.8 meters.

In the history of tagging over 150 white sharks we have only captured a few over 3.5 meters.

If we could transition the language to SPOT tagging only mature white sharks, I believe that would accomplish both of our objectives.

The long term tracking of mature animals is the primary data set required to create the information to confirm mating and birthing areas, so not SPOT tagging a mature shark under 3.5 meters would undermine the primary science objective of this Expedition.

Apologize for just being made aware of this condition, but we find ourselves here spending approx \$500k to advance all of our knowledge with the public highly engaged.

Would be great if we could have a quick call to sort this out.

Not really sure it's shark first/ocean first to go out and catch mature animals we can't Spot tag and thus undermine the Expeditions primary research objective.

Bob's phone number is [REDACTED]

My mobile phone is not working here in Canada.

Grateful for all,

Chris

[REDACTED]

Chris Fischer  
Founding Chairman  
Oearch  
[www.Oearch.org](http://www.Oearch.org)

On Sep 26, 2018, at 3:23 PM, MacDonald, Jennifer <[Jennifer.MacDonald@dfo-mpo.gc.ca](mailto:Jennifer.MacDonald@dfo-mpo.gc.ca)> wrote:

Hi Bob,

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Thank you,  
Jenn

**Jennifer MacDonald**  
Species at Risk Management Division  
(902) 407-8175

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**From:** Robert Hueter [<mailto:rueter@mote.org>]  
**Sent:** September-26-18 12:11 PM  
**To:** MacDonald, Jennifer; [chris@oceanarch.org](mailto:chris@oceanarch.org)  
**Cc:** Gromack, Aimee  
**Subject:** Re: SARA Permit (207-17a) - amendment

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Cheers,  
Bob

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Thank you,  
Jenn

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**MacDonald, Jennifer**

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**From:** Robert Hueter <rhuetter@mote.org>  
**Sent:** September-26-18 6:07 PM  
**To:** MacDonald, Jennifer; chris@oceanarch.org; Humphrey, Donald  
**Cc:** Gromack, Aimee  
**Subject:** Re: SARA Permit (207-17a) - amendment  
**Attachments:** Jewell et al SPOT tag effects.pdf

**Categories:** To file

Hi Jenn & Donald:

Pursuant to this discussion I'm attaching a 2011 paper by Oliver Jewell et al. which concluded that, even though long-term SPOT tagging can cause cosmetic and structural changes to a white shark's dorsal fin, it leads to, in their words, "little compromise on the animal's long term survival and resultant body growth." In other words, the SPOT tags might deform the fins that are still growing, but this doesn't significantly affect the animal's life. As we know, sharks are extremely resilient to wounding and commonly experience compromises to their skin and fins, for example, during mating. Their remarkable healing response to these wounds allows them to continue on with their lives with no effect. In our SARA permit application, we included photos previously SPOT-tagged and healed white sharks in Mexico, and all showed normal body size and function after release of the tags.

Also, we reviewed our database of white sharks studied by OCEARCH, and of our mature males, two were less than 3.5 m TL, the smaller one being 2.99 m TL. So they can mature at less than 3.5 m. One of our two Nova Scotia sharks, Nova, had a stretch total length of more than 3.5 m but the longitudinal total length was 3.41 m, and he had calcified claspers. Our other NS shark Jefferson was 3.86 m TL and also had calcified claspers. Size at maturity is not a knife-edge number but is a range in a species, and clearly these sharks can mature at less than 3.5 m.

So if we could agree on a clarification that we may SPOT-tag only the mature sharks, rather than an arbitrary TL minimum of 3.5 m, that should work for all. Substituting PSAT-tagging for SPOT-tagging is not a solution, as the geolocation tracking data from the PSATs are far less accurate and precise than the SPOT tag data. These are two different tools, with the value of the PSATs being more in their depth and temperature data. Our questions about white sharks in Canada involve such things as the locations of mating sites and pupping areas, for which we need the SPOT tag data.

I hope that helps with your deliberations. We are tied up to the dock through tomorrow morning but are hoping the weather will break by noon and allow us to head out to the fishing grounds again tomorrow afternoon. Donald, we hope to see you on the ship soon, and thank you both again for your help with our research.

Best regards,

Bob

Cell 

**ROBERT E. HUETER, Ph.D.**

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*Perry W. Gilbert Chair in Shark Research*

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On 9/26/2018 3:09 PM, Robert Hueter wrote:

Hi Jenn -

It seems the confusion lies with the interpretation of "large sharks." Yes, we have no need to SPOT-tag any more YOYs, and yes, we are here in Nova Scotia looking for mature adults. But white sharks can mature at substantially less than 3.5m TL, as we've seen in our own data. I'm quite sure we never put in our application anything about limiting our tagging to sharks >3.5m. That's a size that OCEARCH has rarely encountered ever, even in other locations. I sent Aimee a table of length/girth measurements yesterday, and only eight sharks were >3.5m TL, from our global database of ~150 white sharks.

The scientific advice that SPOT tags might significantly affect the animals is debatable, but in any case would only apply to the very young age classes, not the large sub-adults and adults. So that's a moot point here. If we're restricted in our ability to put SPOT tags on the large sharks, it doesn't kill our entire research agenda, which as you know includes 15 different projects for 29 principal investigators from 16 Canadian and US institutions. But it greatly hampers our knowledge and severely curtails our engagement with the public, who follow this work on the Shark Tracker. We'll be forced to explain to the public why we're not SPOT-tagging the other large sharks.

Would this be a possible solution: Could the SARA permit be modified expeditiously to replace ">3.5m TL sharks" with simply "sexually mature sharks"? We can agree to put SPOT tags only on mature animals here in Canada this expedition. Would that work for you?

Standing by.... We're ready to have a phone call on this ASAP. Again my number on the ship is

Bob

**ROBERT E. HUETER, Ph.D.**

*Senior Scientist & Director, Center for Shark Research*

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On 9/26/2018 2:23 PM, MacDonald, Jennifer wrote:

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Cheers,  
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# Effects of Smart Position Only (SPOT) Tag Deployment on White Sharks *Carcharodon carcharias* in South Africa

Oliver J. D. Jewell<sup>1,2\*</sup>, Michelle A. Wcisel<sup>2,4</sup>, Enrico Gennari<sup>3,5</sup>, Alison V. Towner<sup>2,4</sup>, Marthán N. Bester<sup>1</sup>, Ryan L. Johnson<sup>1,3</sup>, Sarika Singh<sup>6</sup>

**1** Mammal Research Institute, University of Pretoria, Hatfield, Pretoria, South Africa, **2** Dyer Island Conservation Trust, Kleinbaai, Western Cape, South Africa, **3** Research, Oceans Research, Mossel Bay, Western Cape, South Africa, **4** ADU Zoology Department, University of Cape Town, Rondebosch, Western Cape, South Africa, **5** South African Institute for Aquatic Biodiversity, Grahamstown, South Africa, **6** Department of Environmental Affairs, Cape Town, Western Cape, South Africa

## Abstract

We present 15 individual cases of sub-adult white sharks that were SPOT tagged in South Africa from 2003–2004 and have been re-sighted as recently as 2011. Our observations suggest SPOT tags can cause permanent cosmetic and structural damage to white shark dorsal fins depending on the duration of tag attachment. SPOT tags that detached within 12–24 months did not cause long term damage to the dorsal fin other than pigmentation scarring. Within 12 months of deployment, tag fouling can occur. After 24 months of deployment permanent damage to the dorsal fin occurred. A shark survived this prolonged attachment and there seems little compromise on the animal's long term survival and resultant body growth. This is the first investigation detailing the long term effects of SPOT deployment on the dorsal fin of white sharks.

**Citation:** Jewell OJD, Wcisel MA, Gennari E, Towner AV, Bester MN, et al. (2011) Effects of Smart Position Only (SPOT) Tag Deployment on White Sharks *Carcharodon carcharias* in South Africa. PLoS ONE 6(11): e27242. doi:10.1371/journal.pone.0027242

**Editor:** Brian Gratwicke, Smithsonian's National Zoological Park, United States of America

**Received:** August 13, 2011; **Accepted:** October 12, 2011; **Published:** November 14, 2011

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**Funding:** These authors have no support or funding to report.

**Competing Interests:** The authors have declared that no competing interests exist

\* E-mail: Oli@sharkwatchsa.com

## Introduction

Monitoring the large scale movements of pelagic animals is logistically difficult due to the vast spatial ranges they transverse. Transmissions from satellite tags can not penetrate the water's surface, and acoustic telemetry requires receivers to be within a limited range to pick up tag transmission. The last decade of pelagic marine animal research has shown that satellite telemetry has greatly enhanced the documentation of these movements [1–5]. For white sharks (*Carcharodon carcharias*) specifically, two types of satellite tag have been used: Pop-off Archival Tags (PAT) and Smart Position Only/Temperature transmitting Tags (SPOT) [6–10]; PAT tags are considered to be low stress generating and a relatively non-invasive method of satellite tagging. White sharks are lured close to a research vessel and the tag is attached below the dorsal fin using a tagging pole as the free-swimming animal passes the vessel [5,11]. PAT tags remain attached for a predetermined period (days/months) before automatically “pop-off”, floating to the surface and transmitting a summary of data collected via satellite. In order to access the full archival record of the tag the tag needs to be retrieved. Tracks are determined from the ARGOS positioning system using data collected on light levels, which can then compare sunrise and sunset and estimated location. These tracks may have root mean square errors of 0.89° of longitude and 1.47° of latitude [12]. SPOT tags are manually attached by drilling through the dorsal fin, which requires the shark to be lifted from the water so that it may be operated on. SPOT tags use GPS based satellite telemetry and transmit data whenever the dorsal fin breaks the surface of the

water. These are capable of operating for several years and generally have positioning errors under 1 km [3].

The methods used to attach SPOT tags have come under scrutiny from the press, public and conservation societies in the wake of documentaries detailing their deployment on large adult white sharks. Unlike smaller species, white sharks are not easily brought on board a vessel and released back to the ocean unharmed because of their size, weight, and strength. SPOT tags have also been attached to many other species, such as small cetaceans, and similar concerns have been raised about catching methods and long term damage. Tissue degradation and possible infection have been documented in bottlenose dolphin (*Tursiops truncatus*) [13], and tissue degradation of shark fins was suspected but only revealed recently [14]. We examine the long term effects of SPOT tag satellite transmitters placed on the dorsal fins of white sharks in South Africa using long term non-invasive dorsal fin identification of individual white sharks

## Methods

All data on re-sighted sharks is taken from incidental observations on either commercial cage diving or chumming research vessels. Initial data from SPOT tagging was collected by Marine and Coastal Management and published under Bonfil et al. [5]. We use photos from their archives but took no part in the actual tagging. As a result no ethics committee approval was required.

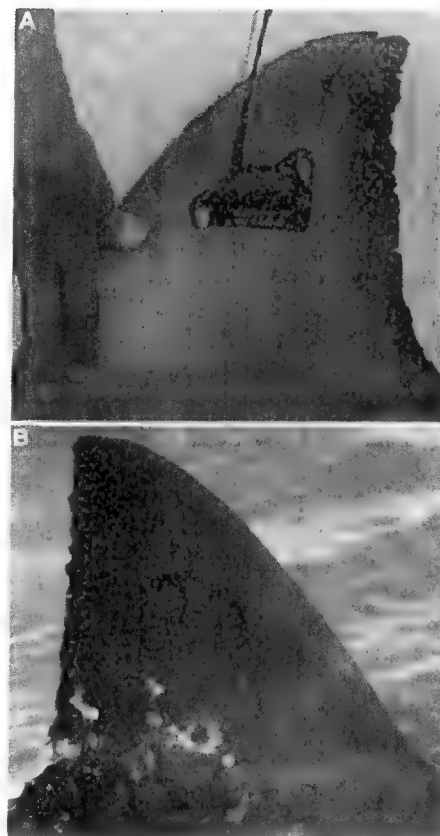
Archived data from the satellite tagging program [5] was compared to incidental observations from current and archived



research and commercial operations. SPOT tags were deployed on 15 white sharks in South African waters between 24<sup>th</sup> May 2003 and 28<sup>th</sup> May 2004. These sharks were caught using a double hook baited line from an anchored research vessel. They were then brought on board a purpose built cradle attached to the research vessel and then lifted from the water. Total length (TL) was measured using a straight line to the nearest cm, and tags were then attached to the first dorsal fin using nylon pins, brass washers and steel nuts [5]. Anti-fouling paint was painted on the tag itself and the bolts, but not on the saltwater switch or the antennae, as this was deemed to interfere with transmissions. Tag attachments were designed to keep tags in place for a period of 9–12 months. Digital images of the sharks' dorsal fins were taken before and after deployment of the tags either while in the cradle, as the shark was being hooked, or as the shark was released as in Johnson ([15], Figure 1A) and shark re-sightings were confirmed by matching photographic dorsal fin IDs as in Chapple et al. [16]. Re-sight images were taken either during research operations in Mossel Bay (2005–2011) or on commercial operations aboard the cage diving vessels of Marine Dynamics in Gansbaai (2007–2011).

## Results

Eight of the instrumented white sharks were re-sighted without their SPOT tags and with the screw holes healed (Table 1; Figure 1B). One shark (GWS-7) was re-sighted 263 days after deployment, without the tag present but with raw scarring from tag bolts. Two further sharks were re-sighted with SPOT tags still in place. One of these sharks (GWS-1) was re-sighted in Mossel Bay 172 days after tagging. The tag displays fouling, but the shark has not been re-sighted since (Figure 2). The second (GWS-3) was seen in Mossel Bay on 31<sup>st</sup> August 2005, 822 days after deployment. The tag shows excessive fouling and the shark showed fin deformation with the fin leaning to the left (Figure 3A,B). The tag detached between that sighting in 2005 and subsequent sightings from 2008 onwards. Permanent deformation and a hole remain, leaving the shark extremely distinctive (Figure 3C,D). The shark has been sighted in 2008, 2009, 2010 and 2011 in Gansbaai, and in 2009 and 2010 in Mossel Bay. Observations of the shark's



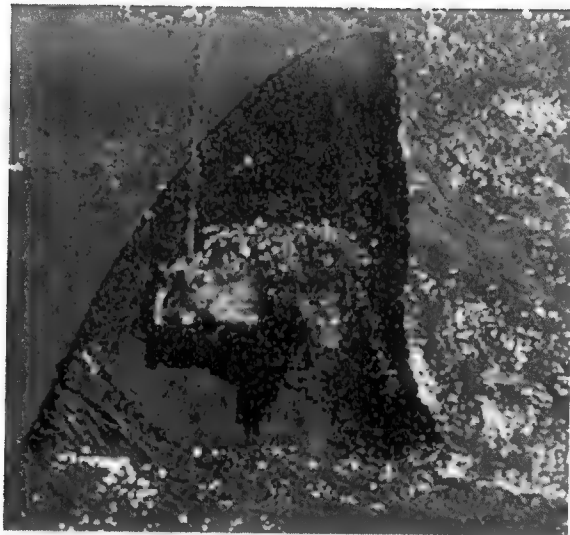
**Figure 1. An example of a white shark with SPOT tag freshly deployed (A) and another with pigmentation scarring following SPOT detachment (B).**

doi:10.1371/journal.pone.0027242.g001

**Table 1.**

GWS	Size	Date of Tagging	Date of first re-sighting	Days at liberty	Location of sighting	State of dorsal fin/tag
1	280	24/05/2003	12/11/2003	172	Mossel Bay	Tag still present, fouling growth on tag
2	300	01/06/2003	21/06/2004	386	Mossel Bay	Fin healed pigmentation scarring still present
3	290	01/06/2003	31/08/2005	822	Mossel Bay/Gansbaai	Fin degraded and leaning to the left
4	315	07/11/2003	27/03/2010	2192	Gansbaai	Fin healed pigmentation scarring still present
5	330	08/11/2003	25/06/1905	n/a	n/a	Tag deployed - no re-sighting
6	330	15/05/2004	09/03/2005	298	Mossel Bay	Fin healed pigmentation scarring still present
7	300	15/05/2004	02/02/2005	263	Mossel Bay	Tag not present bolt holes still raw
8	300	17/05/2004	23/08/2005	463	Mossel Bay	Fin healed pigmentation scarring still present
9	387	18/05/2004	n/a	n/a	Mossel Bay	Tag deployed - no re-sighting
10	305	18/05/2004	n/a	n/a	Mossel Bay	Fin healed pigmentation scarring still present
11	250	18/05/2004	26/06/2005	404	Mossel Bay	Fin healed pigmentation scarring still present
12	340	20/05/2004	02/05/2005	347	Mossel Bay	Fin healed pigmentation scarring still present
13	391	26/05/2004	n/a	n/a	n/a	Tag deployed - no re-sighting
14	391	26/05/2004	n/a	n/a	n/a	Tag deployed - no re-sighting
15	326	28/05/2004	15/05/2007	1082	Gansbaai	Fin healed pigmentation scarring still present

doi:10.1371/journal.pone.0027242.t001



**Figure 2. White shark dorsal fin with SPOT tag in place 172 days after deployment with algal growth on tag.** Sighted in Mossel Bay November 2003, after making a migration from Mossel Bay to Mozambique and back again.  
doi:10.1371/journal.pone.0027242.g002

movement indicate that it is relatively unimpeded by the damages to the dorsal fin (Figure S1). The shark also has further unrelated damage to the left pectoral fin which occurred after the original tagging in 2003.

The size of GWS-3 was estimated at 290 cm when sighted in 2003. Sightings in December 2010 estimated the sharks' length at 375 to 400 cm, using a 400 cm cage for perspective. This suggests a growth of between 85 and 110 cm in 5 years.

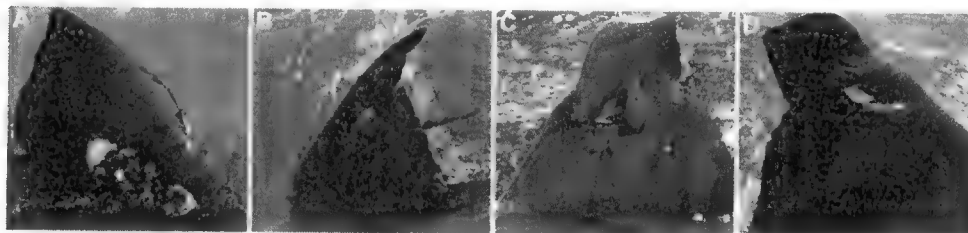
Another shark (GWS-15) tagged on 28/05/2004 was first re-sighted on 27<sup>th</sup> March 2010 in Gansbaai and was acoustically tagged in 2011. It is identifiable by dorsal fin pigmentation scarring and an amputated upper caudal fin (Figure 4). The caudal fin was healed upon capture (Figure 4B) and as a result is considered an unrelated injury to the tagging project. This shark represents the second oldest re-sight since the original tagging campaign in 2003, and suggests that pigmentation scarring caused by SPOT tags is permanent. The shark is estimated at between 380 and 400 cm TL (based on comparison to cage diameters and taking into account the missing section of the upper caudal). At time of tagging, the sharks' total length was measured at 315 cm, representing an estimated growth of 65–85 cm in TL over 7 years.

## Discussion

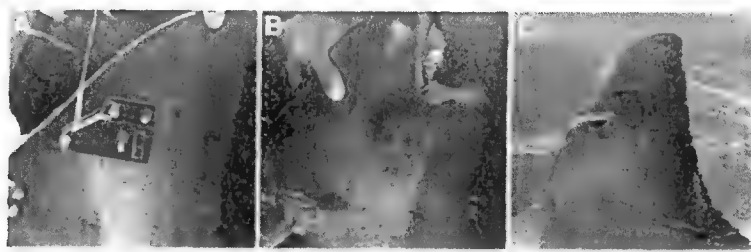
The use of SPOT tags in 2003 provided a unique insight into the large scale movement patterns of South African white sharks. However, the use of hooks to catch sharks and drills to attach the tags to the dorsal fins attracted negative press. The use of SPOT tags on white sharks in North America brought further public criticism, particularly in regard to the catching methods. We therefore embarked on the present investigation which represents the first South African record detailing the effects of SPOT tags to white shark dorsal fins after deployment.

Of the original 15 sharks, 8 sharks were sighted with healed fins and pigmentation scars, one with fresh scars suggesting recent tag detachment, one with the tag still in place and one shark with a deformed fin resulting from SPOT tag deployment. These observations suggest that SPOT tags designed to rust and fall out within 12 months are unlikely to cause permanent damage to the structure of the shark's fin as long as they detach within that time. We only observed permanent degradation to the structure of the fin on a shark's tag that was still present for between 24 and 60 months. The shark would have been considered sub-adult at the time of tagging and as a result growth rates would be expected to be relatively quick [17,18]. Damage to the fins structure was evident from the observation after 24 months. Potential causes of the damage could have been from the impediment of the growth of the fin, pulling it to the left, weight from algal build up on the tag itself which appeared quite excessive 24 months after tag deployment, or quite likely a combination of the two. This result suggests that white sharks yet to obtain full size - particularly while sub-adult and growing fast are unable to sustain SPOT tags in place much longer than 12 months without such damage occurring. Despite the dorsal fin damage to this shark, the shark survived to 2011 and had continued to grow post tag deployment. White sharks can recover from deep tissue wounds (that penetrate skin and muscle) providing vital organs and skeletal structure remain intact [19], however recovery from fin damage is still under investigation and it appears from our results full recovery to the fin has not occurred.

We therefore conclude that based on the tags deployed in South Africa in 2003–2004, SPOT tags did not cause long term damage to the sharks when detached within 12–24 months, but they had the ability to cause permanent structural damage to the dorsal fin when left in place for longer periods. These tags were deployed to relatively sub-adult members of the population (<450 cm) and as such it may be recommended that a review of the tag design is considered for long term deployments to sharks of this size. Observing re-sightings of SPOT tagged white sharks in areas such as Guadalupe or South California would allow a comparison to see if adult white sharks are affected in a similar way. The structural



**Figure 3. Great white shark dorsal fin with SPOT tag present over 24 months after deployment.** (A and B) - tag is showing excessive fouling and fin is leaning to the left as a result of the weight; images taken in 2005 at Mossel Bay and without the tag (C and D) and with resulting hole and fin degradation after tag detachment; images taken in 2009 at Gansbaai.  
doi:10.1371/journal.pone.0027242.g003



**Figure 4. Photo ID of a male white shark tagged in Mossel Bay 2004 with missing upper caudal fin (A and B) re-sighted in Gansbaai 2010 and 2011 from Marine Dynamics cage diving vessel displaying pigmentation scarring from tag (C).**  
doi:10.1371/journal.pone.0027242.g004

damage to the dorsal fin caused by SPOT tags did not appear to negatively effect the long term survival of the shark and the re-sighting of individuals post tagging and of tracks of individuals not re-sighted suggest there were no mortalities as a result of this programme. However, the effects of removing large (>450 cm white sharks from the water in order to deploy SPOT tags are still unknown and should also be considered.

## Supporting Information

**Figure S1 White shark displaying damage to the dorsal fin as a result of SPOT tag deployment breaks the water at Gansbaai, South Africa during a Marine Dynamics cage diving trip.** Photo courtesy of Michelle Weisel, Marine Dynamics (TIF)

## References

1. Boustanly AM, Davis SJ, Pyle P, Anderson SD, Le Boeuf BJ, et al. (2006) Satellite tagging: expanded niche for white sharks. *Nature* 442: 35–36.
2. Block BA (2006) Physiological ecology in the 21st Century: advancements in fish biology science. *Integr Comp Biol* 45: 337–339.
3. Wong KC, Cailliet J, Morrissey J, Lavett-Landry AM, Hols DB, et al. (2006) Satellite tagging and cardiac physiological niche expansion in salmon sharks. *Science* 315: 100–103.
4. Block BA, Jorgensen JD, Jorgensen SJ, Waples AJ, Shaffer SA, et al. (2011) Tracking apex marine predators in a dynamic ocean. *Nature* 475: 69–79.
5. Bonfil R, Meyer M, Scholl MC, Johnson R, O'Brien S, et al. (2009) Trans-oceanic migration, spatial dynamics, and population linkages of white sharks. *Science* 310: 100–103.
6. Wong KC, Boustanly AM, Pyle P, Anderson SD, Brown A, et al. (2006) Migration and habitat of white sharks (*Carcharodon carcharias*) in the eastern Pacific Ocean. *Mar Biol* 150: 377–393.
7. Wong KC, O'Sullivan JB, Lowe CG, Wilson CE, Dewar H, et al. (2006) Movements, foraging, and habitat preferences of juvenile white sharks (*Carcharodon carcharias*) in the eastern Pacific. *Mar Ecol Prog Ser* 328: 197–214.
8. Nichols J, Dean N, Dewar H, Lam CH, Goldman KJ, Donner M (2006) White shark offshore habitat: A behavioural and environmental barometer for the Eastern Pacific's swordfishery. *PLoS ONE* 4: 12–16.
9. Bonfil R, Francis MP, Ditty C, Menni M, O'Brien SO (2006) Large-scale reproductive movements and feeding behaviour of white sharks (*Carcharodon carcharias*) in New Zealand. *Aquat Bot* 4: 113–122.
10. Jorgensen SJ, Riebel CA, Grappin TK, Anderson SD, Pyle P, et al. (2010) Philopatry and migration of Pacific white sharks. *Proc R Soc B Biol Sci* 277: 2010.0124.

## Acknowledgments

This project uses data from recent and ongoing projects of Marine Dynamics/Dyer Island Conservation Trust and Oceans Research as well as past projects from DEA, Oceans and Coasts Research (formerly Marine and Coastal Management, MCM) - thanks to all organisations for your support. Thanks to Nick Jones of Marine Dynamics for figure 1C. Thanks to David Edwards of Creative-Resolve.com for figure editing.

## Author Contributions

Conceived and designed the experiments: OJDJ MAW EG AVT MNB RIJ SS. Performed the experiments: OJDJ MAW EG AVT RIJ SS. Analyzed the data: OJDJ MAW EG AVT MNB RIJ SS. Contributed reagents/materials/analysis tools: OJDJ MAW EG AVT RIJ SS. Wrote the paper: OJDJ MAW EG AVT MNB SS.

11. Johnson R, Bester MN, Dwyer SFJ, Oosthuizen WH, Meyer M, et al. (2006) Coastal swimming patterns of white sharks (*Carcharodon carcharias*) at Mossel Bay, South Africa. *Environ Biol Fishes* 35: 189–200.
12. Tan S-H, Boustanly A, Blokveit S, Wals V, Wong KC, et al. (2008) Validation of geolocation estimates based on light level and sea surface temperature from electronic tags. *Mar Ecol Prog Ser* 283: 81–91.
13. Brainerd BC, Schwacke LH, Wells RS (2010) Linking cove behaviour to satellite-linked tag condition for a bottlenose dolphin (*Tursiops truncatus*) along Florida's Northern Gulf of Mexico coast. *Aqua Mamm* 36: 1–6.
14. Hammerschlag N, Gallagher AJ, Lazarus DM (2011) A review of shark satellite tagging studies. *J Exp Mar Biol Ecol* 404: 1–12. doi:10.1016/j.jembe.2010.12.002
15. Jorgensen R (2011) Behavioural ecology of white sharks at Mossel Bay. PhD thesis, University of Pretoria, South Africa.
16. Grappin TK, Jorgensen SJ, Anderson SD, Kameke PE, Kinsley AP, et al. (2011) A first estimate of white shark (*Carcharodon carcharias*) abundance off central California. *Biol Lett* 8: 1003–1007. doi:10.1098/rsbl.2011.0121
17. Bruce BD (1992) Preliminary observations on the biology of white sharks (*Carcharodon carcharias*) in South Australian waters. *Aust J Mar and Freshwater Res* 43: 1–11.
18. Makort H, Bruce BD, Stevens JD (2007) A review of the biology and ecology of white sharks in Australian waters. Report to Environment Australia Marine Species Protection Program. CSIRO Marine Research Hobart, 41 p.
19. Fowler A, Smith M, Jorgensen O (2011) Bite strike wound healing in *Carcharodon carcharias*. In: *Proceedings of white shark research CRC Press*.

## MacDonald, Jennifer

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**From:** Schaefer, Heidi  
**Sent:** September-27-18 1:09 PM  
**To:** MacDonald, Jennifer  
**Cc:** Gromack, Aimee  
**Subject:** RE: SARA Permit (207-17a) - amendment

**Categories:** To file

Hi,

I'm not going to have time to meet. It might be more efficient to just go to Donald. I feel like this is going to come down to his judgement call anyway.

Heidi

**From:** MacDonald, Jennifer  
**Sent:** Thursday, September 27, 2018 12:13 PM  
**To:** Schaefer, Heidi <Heidi.Schaefer@dfo-mpo.gc.ca>  
**Cc:** Gromack, Aimee <Aimee.Gromack@dfo-mpo.gc.ca>  
**Subject:** FW: SARA Permit (207-17a) - amendment

Hi Heidi,

Aimee and I met with Heather and Warren this morning; they indicated that they feel we are well justified in setting the length limit at 3.5m. The attached note to file summarizes our meeting with them. I would suggest that you, Aimee and I may want to discuss before providing a recommendation back to Donald. He also indicated that he may want to discuss with Kent before responding to OCEARCH.

I am available anytime to discuss.

Thanks!

Jenn

**Jennifer MacDonald**

Species at Risk Management Division  
(902) 407-8175

---

**From:** Humphrey, Donald  
**Sent:** September-26-18 5:09 PM  
**To:** MacDonald, Jennifer  
**Cc:** Gromack, Aimee; Schaefer, Heidi  
**Subject:** Fw: SARA Permit (207-17a) - amendment

Can you please follow up with Warren/heather tomorrow to get their perspective. Chris and Bob are going to send some recent papers and data to help support potential amendments.

Thanks.

Sent from my BlackBerry 10 smartphone on the Rogers network.

---

**From:** Robert Hueter <[rhuetter@mote.org](mailto:rhuetter@mote.org)>  
**Sent:** Wednesday, September 26, 2018 4:09 PM  
**To:** MacDonald, Jennifer; [chris@ocearch.org](mailto:chris@ocearch.org); Humphrey, Donald  
**Cc:** Gromack, Aimee  
**Subject:** Re: SARA Permit (207-17a) - amendment

Hi Jenn -

It seems the confusion lies with the interpretation of "large sharks." Yes, we have no need to SPOT-tag any more YOYs, and yes, we are here in Nova Scotia looking for mature adults. But white sharks can mature at substantially less than 3.5m TL, as we've seen in our own data. I'm quite sure we never put in our application anything about limiting our tagging to sharks >3.5m. That's a size that OCEARCH has rarely encountered ever, even in other locations. I sent Aimee a table of length/girth measurements yesterday, and only eight sharks were >3.5m TL, from our global database of ~150 white sharks.

The scientific advice that SPOT tags might significantly affect the animals is debatable, but in any case would only apply to the very young age classes, not the large sub-adults and adults. So that's a moot point here. If we're restricted in our ability to put SPOT tags on the large sharks, it doesn't kill our entire research agenda, which as you know includes 15 different projects for 29 principal investigators from 16 Canadian and US institutions. But it greatly hampers our knowledge and severely curtails our engagement with the public, who follow this work on the Shark Tracker. We'll be forced to explain to the public why we're not SPOT-tagging the other large sharks.

Would this be a possible solution: Could the SARA permit be modified expeditiously to replace ">3.5m TL sharks" with simply "sexually mature sharks"? We can agree to put SPOT tags only on mature animals here in Canada this expedition. Would that work for you?

Standing by.... We're ready to have a phone call on this ASAP. Again my number on the ship is [REDACTED]

Bob

**ROBERT E. HUETER, Ph.D.**

*Senior Scientist & Director, Center for Shark Research  
Perry W. Gilbert Chair in Shark Research  
Manager, Sharks & Rays Conservation Research Program  
Mote Marine Laboratory  
1600 Ken Thompson Parkway  
Sarasota, FL 34236 USA*

*Chief Science Advisor, OCEARCH*

[rhuetter@mote.org](mailto:rhuetter@mote.org)

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More info at: [www.mote.org](http://www.mote.org)

On 9/26/2018 2:23 PM, MacDonald, Jennifer wrote:

Hi Bob,

In response to your email below, I want to clarify your interpretation of the statement "all White Sharks caught, up to 20, will have both acoustic and SPOT tags applied." This statement is included in the "Description of the Activity" section of your permit and is not to be interpreted as a directive from DFO to tag as many sharks as possible. This section of the permit is simply meant to outline the proposed activities, including specifics about how they may be carried out. This statement simply indicates that you requested to apply both types of tags on the same individuals, up to 20 sharks.

With respect to the condition placed on the total length for tagging, this was based on the best available science we had when we reviewed your application, including scientific advice that SPOT tags in particular may affect fin development in juveniles. Further, the condition to limit the size of sharks that can be tagged was consistent with your own permit request, which indicated that you were requesting to "sample up to 20 large animals in Canadian waters." In the information you submitted to our office on January 31<sup>st</sup>, you indicated that the power analysis you have completed indicated that a sample size of 60 individuals is required for the various studies you are undertaking globally (20 young-of-the-year (YOY), 20 immature and 20 mature individuals); you further indicated that you did not require additional tags on any YOY and that the Canadian expedition would be targeting large individuals.

All the permit conditions were determined based on the best available science we had at the time. It is not feasible to consider changing these on such short notice; to make changes would require further review, which could take several weeks.

However, one option that may be available, would be to amend condition 2.15 to specify that the restriction is in relation to SPOT tags. The decision to include this condition was based specifically on concerns about the attachment of SPOT tags on smaller individuals. As you indicate in your email, we are certainly interested in information on other age classes in Canadian waters, which could be attained from acoustic or PSAT tags. If this is something you would like us to consider, please advise me in writing of this.

Thank you,  
Jenn

**Jennifer MacDonald**  
Species at Risk Management Division  
(902) 407-8175

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**From:** Robert Hueter [<mailto:rhoeter@mote.org>]  
**Sent:** September-26-18 12:11 PM  
**To:** MacDonald, Jennifer; [chris@oceanresearch.org](mailto:chris@oceanresearch.org)  
**Cc:** Gromack, Aimee  
**Subject:** Re: SARA Permit (207-17a) - amendment

Hi Jenn:

Thank you for this amendment, very much appreciate the quick turnaround on this. We're tied up at the dock in Lunenburg today with the weather coming through, but tomorrow afternoon and beyond are looking good, so we'll be back at it soon.

I just called your office and left you a voicemail. You can call me back at [REDACTED] We have a question about our permit to tag as it relates to shark size. On page 2 of the SARA permit it states that, "All White Sharks caught, up to 20, will have both acoustic and SPOT tags applied." We've taken this as a directive to tag as many white sharks as possible here, up to 20, to maximize the data and learning from Canadian shark movement. As I think you know, in U.S. waters we've tagged everything from young-of-the-year (YOYs) to mature adults, with excellent results from their SPOT tags to fill in gaps in our knowledge of white shark life history. The two males we've tagged here so far had contour lengths and stretch total lengths of >3.5m, with total lengths just a bit under that mark. Can you provide the rationale for the 3.5m TL condition, so that we can understand what the concern there is? Please understand we do have a smaller version of the SPOT onboard to use on the very young animals -- we used this with our YOY studies off Long Island, NY. But we've found that the older juveniles through adults all tolerate the larger SPOT tag very well, and give us excellent data. I'm sure that DFO and

COSEWIC wants data on all size classes of white sharks in Canadian waters, correct?

Please call me back as soon as possible, hopefully today while we're weather-bound, so that we can discuss this. We'd also like to fill you in on our exciting results with sharks Nova and Jefferson, and the sighting of another white shark earlier in the expedition. We love it here and everyone has been so welcoming!

Cheers,  
Bob

**ROBERT E. HUETER, Ph.D.**

*Senior Scientist & Director, Center for Shark Research  
Perry W. Gilbert Chair in Shark Research  
Manager, Sharks & Rays Conservation Research Program  
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On 9/26/2018 7:27 AM, MacDonald, Jennifer wrote:

Hello Bob and Chris,

I have attached the amendment to your *Species at Risk Act* Section 73 Permit as requested. The Location of Proposed Activity (page 1) has been amended to include all of the waters within the Maritimes Region of DFO. Note, that we also slightly modified condition 2.15. The condition still limits the size of sharks that may be tagged, but removed the condition in relation to capture of sharks only above a certain size. This was in recognition of the difficulty in accurately determining the size of a shark before it is caught.

As with the original permit, you should keep a printed copy of the signed permit onboard at all times and ensure all members of the research team are familiar with all of the conditions of the permit.

Thank you,  
Jenn

**Jennifer MacDonald**

Species at Risk Biologist | Biologiste des espèces en péril  
Species at Risk Management Division | Division de la gestion des espèces en péril  
Ecosystem Management | Gestion des écosystèmes  
Fisheries & Oceans Canada | Pêches & Océans Canada  
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Email | Courriel: [jennifer.macdonald@dfo-mpo.gc.ca](mailto:jennifer.macdonald@dfo-mpo.gc.ca)

**MacDonald, Jennifer**

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**From:** Gromack, Aimee  
**Sent:** September-27-18 1:14 PM  
**To:** MacDonald, Jennifer  
**Subject:** RE: Shark tagging

Thanks!

---

**From:** MacDonald, Jennifer  
**Sent:** September-27-18 12:21 PM  
**To:** Gromack, Aimee  
**Subject:** FW: Shark tagging

**Jennifer MacDonald**  
Species at Risk Management Division  
(902) 407-8175

---

**From:** Bowlby, Heather  
**Sent:** September-27-18 12:15 PM  
**To:** MacDonald, Jennifer  
**Subject:** RE: Shark tagging

Here you go!  
H

**From:** MacDonald, Jennifer  
**Sent:** Thursday, September 27, 2018 11:45 AM  
**To:** Bowlby, Heather <[Heather.Bowlby@dfo-mpo.gc.ca](mailto:Heather.Bowlby@dfo-mpo.gc.ca)>  
**Subject:** RE: Shark tagging

Do you also have the Takeda paper that you mentioned this morning? I couldn't find that one. Thanks!

**Jennifer MacDonald**  
Species at Risk Management Division  
(902) 407-8175

---

**From:** Bowlby, Heather  
**Sent:** September-27-18 10:08 AM  
**To:** MacDonald, Jennifer  
**Subject:** RE: Shark tagging

Hey,  
Just in case you can't find the paper quickly, here is Natanson & Skomal. It is worth noting that the lengths they give are fork length not total length. So 3.5 m total length would be much smaller than 3.5 m fork length.  
H



**From:** MacDonald, Jennifer  
**Sent:** Thursday, September 27, 2018 8:02 AM  
**To:** Bowlby, Heather <[Heather.Bowlby@dfo-mpo.gc.ca](mailto:Heather.Bowlby@dfo-mpo.gc.ca)>; Joyce, Warren <[Warren.Joyce@dfo-mpo.gc.ca](mailto:Warren.Joyce@dfo-mpo.gc.ca)>  
**Subject:** Shark tagging

Hi Heather and Warren,

As you are aware, we included a condition in OCEARCH's permit that restricted their tagging to sharks over 3.5m. This was based on discussion with both of you and information you provided us that suggested that SPOT tags may impact developing fins if applied to immature sharks. I've attached our original correspondence on this.

OCEARCH is now requesting that we amend this condition to indicate that they are only to apply SPOT tags to mature sharks (without specifying a size). Their rationale is that sharks mature at a smaller size than 3.5m. I have attached our email correspondence with Bob and Chris on this.

I wondered what your thoughts are with respect to what size we would consider to be mature sharks? Given your expertise and experience, what are your thoughts with respect to the potential impacts of the SPOT tags on sharks of various sizes?

As you know, OCEARCH is here now and actively out trying to tag, so are looking for a response from us as soon as possible. Happy to get together to chat if that is easier for you.

Thank you,  
Jenn

**Jennifer MacDonald**

Species at Risk Biologist | Biologiste des espèces en péril  
Species at Risk Management Division | Division de la gestion des espèces en péril  
Ecosystem Management | Gestion des écosystèmes  
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**MacDonald, Jennifer**

---

**From:** MacDonald, Jennifer  
**Sent:** September-27-18 3:42 PM  
**To:** Humphrey, Donald  
**Cc:** Schaefer, Heidi; Gromack, Aimee  
**Subject:** FW: SARA Permit (207-17a) - amendment  
**Attachments:** Note to file Science meeting 2018-09-27.docx; OCEARCH amendment request\_options.docx

**Follow Up Flag:** Follow up  
**Flag Status:** Completed

Hi Donald,

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I'm happy to discuss further; if we want to walk through these options tomorrow.

Jenn

**Jennifer MacDonald**  
Species at Risk Management Division  
(902) 407-8175

---

**From:** MacDonald, Jennifer  
**Sent:** September-27-18 12:13 PM  
**To:** Schaefer, Heidi  
**Cc:** Gromack, Aimee  
**Subject:** FW: SARA Permit (207-17a) - amendment

Hi Heidi,  
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I am available anytime to discuss.  
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**Sent:** September-26-18 5:09 PM  
**To:** MacDonald, Jennifer  
**Cc:** Gromack, Aimee; Schaefer, Heidi  
**Subject:** Fw: SARA Permit (207-17a) - amendment

Can you please follow up with Warren/heather tomorrow to get their perspective. Chris and Bob are going to send some recent papers and data to help support potential amendments.

Thanks.

Sent from my BlackBerry 10 smartphone on the Rogers network.

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**From:** Robert Hueter <rhuetter@mote.org>  
**Sent:** Wednesday, September 26, 2018 4:09 PM  
**To:** MacDonald, Jennifer; chris@ocearch.org; Humphrey, Donald  
**Cc:** Gromack, Aimee  
**Subject:** Re: SARA Permit (207-17a) - amendment

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Would this be a possible solution: Could the SARA permit be modified expeditiously to replace ">3.5m TL sharks" with simply "sexually mature sharks"? We can agree to put SPOT tags only on mature animals here in Canada this expedition. Would that work for you?

Standing by.... We're ready to have a phone call on this ASAP. Again my number on the ship is 

Bob

**ROBERT E. HUETER, Ph.D.**  
*Senior Scientist & Director, Center for Shark Research*  
*Perry W. Gilbert Chair in Shark Research*  
*Manager, Sharks & Rays Conservation Research Program*  
*Mote Marine Laboratory*  
*1600 Ken Thompson Parkway*  
*Sarasota, FL 34236 USA*

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Hi Bob,

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With respect to the condition placed on the total length for tagging, this was based on the best available science we had when we reviewed your application, including scientific advice that SPOT tags in particular may affect fin development in juveniles. Further, the condition to limit the size of sharks that can be tagged was consistent with your own permit request, which indicated that you were requesting to "sample up to 20 large animals in Canadian waters." In the information you submitted to our office on January 31<sup>st</sup>, you indicated that the power analysis you have completed indicated that a sample size of 60 individuals is required for the various studies you are undertaking globally (20 young-of-the-year (YOY), 20 immature and 20 mature individuals); you further indicated that you did not require additional tags on any YOY and that the Canadian expedition would be targeting large individuals.

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However, one option that may be available, would be to amend condition 2.15 to specify that the restriction is in relation to SPOT tags. The decision to include this condition was based specifically on concerns about the attachment of SPOT tags on smaller individuals. As you indicate in your email, we are certainly interested in information on other age classes in Canadian waters, which could be attained from acoustic or PSAT tags. If this is something you would like us to consider, please advise me in writing of this.

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Hi Jenn:

Thank you for this amendment, very much appreciate the quick turnaround on this. We're tied up at

the dock in Lunenburg today with the weather coming through, but tomorrow afternoon and beyond are looking good, so we'll be back at it soon.

I just called your office and left you a voicemail. You can call me back at [REDACTED] We have a question about our permit to tag as it relates to shark size. On page 2 of the SARA permit it states that, "All White Sharks caught, up to 20, will have both acoustic and SPOT tags applied." We've taken this as a directive to tag as many white sharks as possible here, up to 20, to maximize the data and learning from Canadian shark movement. As I think you know, in U.S. waters we've tagged everything from young-of-the-year (YOYs) to mature adults, with excellent results from their SPOT tags to fill in gaps in our knowledge of white shark life history. The two males we've tagged here so far had contour lengths and stretch total lengths of >3.5m, with total lengths just a bit under that mark. Can you provide the rationale for the 3.5m TL condition, so that we can understand what the concern there is? Please understand we do have a smaller version of the SPOT onboard to use on the very young animals -- we used this with our YOY studies off Long Island, NY. But we've found that the older juveniles through adults all tolerate the larger SPOT tag very well, and give us excellent data. I'm sure that DFO and COSEWIC wants data on all size classes of white sharks in Canadian waters, correct?

Please call me back as soon as possible, hopefully today while we're weather-bound, so that we can discuss this. We'd also like to fill you in on our exciting results with sharks Nova and Jefferson, and the sighting of another white shark earlier in the expedition. We love it here and everyone has been so welcoming!

Cheers,  
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As with the original permit, you should keep a printed copy of the signed permit onboard at all times and ensure all members of the research team are familiar with all of the conditions of the permit.

Thank you,  
Jenn

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Species at Risk Biologist | Biologiste des espèces en péril  
Species at Risk Management Division | Division de la gestion des espèces en péril  
Ecosystem Management | Gestion des écosystèmes  
Fisheries & Oceans Canada | Pêches & Océans Canada  
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Email | Courriel: [jennifer.macdonald@dfo-mpo.gc.ca](mailto:jennifer.macdonald@dfo-mpo.gc.ca)



## NOTE TO FILE

FILE NUMBER - NUMÉRO DE DOSSIER

CALL IN		CALL OUT		SITE VISIT		NOTE	<b>X</b>	TIME HEURE	DATE (Y-A - M - D-J)
NAMES OF PERSON(S) CONTACTED NOM(S) DE LA (DES) PERSONNE(S) CONTACTÉE(S)									2018-09-27
Meeting with Heather Bowlby, Warren Joyce, Aimee Gromack									
SUBJECT - OBJET									
Request by OCEARCH to amend permit condition 2.15 (minimum total length for SPOT tagging)									
SUMMARY - RESUME									
<ul style="list-style-type: none"><li>Discussed with Science the information/evidence upon which the original condition, limiting tagging to sharks over 3.5 m, was based.</li><li>Primary reference was study by Jewell et al. (2011) that indicated that SPOT tags can cause cosmetic and structural damage to white shark dorsal fins, including permanent damage with a tag attached for more than 24 months; data on permanent damage was based on an individual tagged at 2.8 m, but paper concluded that there should be caution applied to SPOT tagging any individuals less than 4.5 m.</li><li>Jewell et al. (2011) did indicate that while there may be permanent deformity caused to the fin, there is no evidence that the fin deformity affected long-term survival; however, Heather noted that survival does not necessarily equate to not affecting fitness (no ability to determine if it affects reproduction, etc.)</li><li>White sharks have indeterminate growth; however, growth does slow at sexual maturity. Fins are more vulnerable to damage before maturity, when there is more rapid growth.</li><li>Original OCEARCH permit set 3.5 m as a minimum size, based on published data that suggests the range of sizes for males/females at sexual maturity; Heather and Warren provided the following as references:<ul style="list-style-type: none"><li>Astro (2009) – females mature at 4.5 m</li><li>Natanson and Skomal (2015): Estimates of size and age at maturity for the white shark are broad and variable depending on the study; they suggest <u>mean</u> length at maturity for a male is approx. 350 cm <u>fork length</u> (note fork length is less than total length);<ul style="list-style-type: none"><li>Reference two other studies: Pratt (1996) – suggested that male size at maturity is 352 cm <u>fork length</u> (North Atlantic)</li><li>Francis (1996) – female size at maturity occurs over a broad size range (417-464 cm fork length; 450-500 cm total length)</li></ul></li><li>Takeda – study in the Pacific; the low end of maturity range is around 3.1 m</li></ul></li><li>Science indicated that published data does not support assertion that animals are sexually mature at 2.8 m, as claimed by OCEARCH (indicate they have record of sexually mature sharks as small as 2.8 m).</li><li>OCEARCH has indicated they can assess sexual maturity based on the calcification of the claspers<ul style="list-style-type: none"><li>Heather advised that while this can be a good indication of maturity (in males), it is not conclusive</li></ul></li></ul>									

- Conclusive information to determine sexual maturity would require analysis of a semen sample (males) or necropsy (female).
- Heather advised that the best tool on which to base a determination of sexual maturity is length, based on published data on size at maturity.

CONCLUSION - CONCLUSIONS		ACTION TAKEN - SUITE DONNÉE		ACTION REQUIRED - SUITE À DONNER	
RECORDED BY ENREGISTRÉ PAR	NAME - NOM Jennifer MacDonald	DIVISION - DIVISION Species at Risk Management Division		TELEPHONE - TÉLÉPHONE 902-407-8175	



Option	Potential wording for condition 2.15	Rationale	Risks
Status quo	<p>No change: Only White Sharks greater than 3.5 metres in total length shall be tagged</p>	<ul style="list-style-type: none"> <li>Original condition was based on study by Jewell et al. (2011) that indicated SPOT tags can cause permanent damage to White Shark fins (if attached for more than 24 months);               <ul style="list-style-type: none"> <li>data on permanent damage was based on a 2.8m individual being tagged; paper concluded that there should be caution applied to SPOT tagging individuals less than 4.5m.</li> </ul> </li> <li>Original permit set 3.5m <u>total</u> length as a minimum size, based on published data sets that present a range of sizes at which White Sharks mature. For the North Atlantic, it is suggested that the mean size at which a male is considered mature is 3.5m <u>fork</u> length (which would equate to a larger total length); females likely mature at 4.5-5m total length.</li> <li>Jewell et al (2011) concluded that SPOT tags did not seem to impact survival; DFO-Science advised however that the long-term impact of SPOT tags on fitness (rather than just survival) is unknown, therefore limiting tagging to mature individuals was deemed to be a precautionary approach.</li> </ul>	<ul style="list-style-type: none"> <li>The Jewell et al. (2011) paper indicated that while there may be permanent deformity caused to the fin, there is no evidence that the fin deformity affected long-term survival.               <ul style="list-style-type: none"> <li>OCEARCH concludes from this that SPOT tags do not affect an individual at all.</li> <li>DFO Science advises that survival does not necessarily equate to not affecting fitness (no ability to determine if it affects reproduction, etc.)</li> </ul> </li> </ul>
Partial Amendment	<p>No more than 3 White Sharks that are determined to be sexually mature (based on observation of calcified claspers) and are under 3.5 metres in total length shall be tagged with SPOT tags. All other White Sharks tagged with SPOT tags shall be greater than 3.5 metres in total length.</p>		

Amend as per request by OCEARCH	Only sexually mature White Sharks (as determined by observation of calcified claspers) shall be tagged with SPOT tags.	<ul style="list-style-type: none"> <li>OCEARCH has indicated that they have observed sexually mature white sharks as small as 2.99 m.</li> <li>While it is not conclusive, the calcification of the claspers can be a good indication of maturity.</li> <li>The Jewell et al. (2011) paper indicated that while SPOT tags may cause permanent damage to fins in immature individuals, there is no evidence that this impacts survival.</li> <li>As above, there is allowable harm for the species, such that if there was some level of fitness impacts, it would be unlikely to jeopardize survival and recovery.</li> </ul>	<ul style="list-style-type: none"> <li>DFO Science is not supportive and disagrees with the conclusion that mature sharks are as small as 2.99 m.</li> <li>DFO Science advises that the best tool to use to base a determination of sexual maturity is length (based on published data on size at maturity).</li> </ul>
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**MacDonald, Jennifer**

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**From:** Gromack, Aimee  
**Sent:** September-28-18 10:11 AM  
**To:** Schaefer, Heidi; MacDonald, Jennifer; Humphrey, Donald  
**Subject:** RE: SARA Permit (207-17a) - amendment

Hi Heidi,

I think a CSAS request to investigate the length at maturity and/or impacts from different tagging application methodologies would be useful. I can put requests together if you like. Let me know what you have in mind.

I think photos for evidence of clasper calcification would be useful. I am not sure what other data we could ask for but I will look into it.

Cheers,


Aimee

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**From:** Schaefer, Heidi  
**Sent:** September-28-18 9:14 AM  
**To:** MacDonald, Jennifer; Humphrey, Donald  
**Cc:** Gromack, Aimee  
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Thanks Jenn, this is great and will hopefully help in decision making.

A couple of comments:

- If we go with Option 2 or 3, could we ask for some kind of evidence (photo or other) of clasper calcification on all sharks boarded and tagged?
- We should be clear in our interactions with Science, and in our documentation of that, on our roles and responsibilities. 
- Knowing that the call for CSAS 2018-19 will be coming out soon, and that OSEARCH may be back in future years, do we think a CSAS request might be in order?

Heidi

**From:** MacDonald, Jennifer  
**Sent:** Thursday, September 27, 2018 3:42 PM  
**To:** Humphrey, Donald <Donald.Humphrey@dfo-mpo.gc.ca>  
**Cc:** Schaefer, Heidi <Heidi.Schaefer@dfo-mpo.gc.ca>; Gromack, Aimee <Aimee.Gromack@dfo-mpo.gc.ca>  
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**MacDonald, Jennifer**

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**To:** MacDonald, Jennifer  
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**Subject:** RE: SARA Permit (207-17a) - amendment

**Categories:** To file

Thanks Jenn. Based on the information available and provided both by Science and Oearch, I am not comfortable with removing the size restriction fully. I would like for us to discuss the other two options tomorrow morning if you could set up a meeting amongst those on this email.

Donald

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**Subject:** FW: SARA Permit (207-17a) - amendment

Hi Donald,

Aimee and I met with Heather and Warren this morning (see attached notes from our discussion). They do not support any amendments to the permit conditions. Heidi suggested a suite of options we could consider; she asked that I draft 3 options and send them to you. I have drafted the attached which presents 3 options (no change to the conditions, fully amending the condition to OCEARCH's request or a middle ground) along with the considerations for each. There is a some uncertainty associated with the supporting data and there are a number of broader considerations, especially related to support from DFO Science and risk of OCEARCH publicly objecting to the results.

I'm happy to discuss further; if we want to walk through these options tomorrow.

Jenn

**Jennifer MacDonald**  
Species at Risk Management Division  
(902) 407-8175

---

**From:** MacDonald, Jennifer  
**Sent:** September-27-18 12:13 PM  
**To:** Schaefer, Heidi  
**Cc:** Gromack, Aimee  
**Subject:** FW: SARA Permit (207-17a) - amendment

Hi Heidi,  
Aimee and I met with Heather and Warren this morning; they indicated that they feel we are well justified in setting the length limit at 3.5m. The attached note to file summarizes our meeting with them. I would suggest that you, Aimee and I



may want to discuss before providing a recommendation back to Donald. He also indicated that he may want to discuss with Kent before responding to OCEARCH.

I am available anytime to discuss.

Thanks!

Jenn

**Jennifer MacDonald**

Species at Risk Management Division

(902) 407-8175

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**From:** Humphrey, Donald

**Sent:** September-26-18 5:09 PM

**To:** MacDonald, Jennifer

**Cc:** Gromack, Aimee; Schaefer, Heidi

**Subject:** Fw: SARA Permit (207-17a) - amendment

Can you please follow up with Warren/heather tomorrow to get their perspective. Chris and Bob are going to send some recent papers and data to help support potential amendments.

Thanks.

Sent from my BlackBerry 10 smartphone on the Rogers network.

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**From:** Robert Hueter <rhuetter@mote.org>

**Sent:** Wednesday, September 26, 2018 4:09 PM

**To:** MacDonald, Jennifer; chris@ocearch.org; Humphrey, Donald

**Cc:** Gromack, Aimee

**Subject:** Re: SARA Permit (207-17a) - amendment

Hi Jenn -

It seems the confusion lies with the interpretation of "large sharks." Yes, we have no need to SPOT-tag any more YOYs, and yes, we are here in Nova Scotia looking for mature adults. But white sharks can mature at substantially less than 3.5m TL, as we've seen in our own data. I'm quite sure we never put in our application anything about limiting our tagging to sharks >3.5m. That's a size that OCEARCH has rarely encountered ever, even in other locations. I sent Aimee a table of length/girth measurements yesterday, and only eight sharks were >3.5m TL, from our global database of ~150 white sharks.

The scientific advice that SPOT tags might significantly affect the animals is debatable, but in any case would only apply to the very young age classes, not the large sub-adults and adults. So that's a moot point here. If we're restricted in our ability to put SPOT tags on the large sharks, it doesn't kill our entire research agenda, which as you know includes 15 different projects for 29 principal investigators from 16 Canadian and US institutions. But it greatly hampers our knowledge and severely curtails our engagement with the public, who follow this work on the Shark Tracker. We'll be forced to explain to the public why we're not SPOT-tagging the other large sharks.

Would this be a possible solution: Could the SARA permit be modified expeditiously to replace ">3.5m TL sharks" with simply "sexually mature sharks"? We can agree to put SPOT tags only on mature animals here in Canada this expedition. Would that work for you?

Standing by.... We're ready to have a phone call on this ASAP. Again my number on the ship is 

Bob

**ROBERT E. HUETER, Ph.D.**

Senior Scientist & Director, Center for Shark Research

*Perry W. Gilbert Chair in Shark Research  
Manager, Sharks & Rays Conservation Research Program  
Mote Marine Laboratory  
1600 Ken Thompson Parkway  
Sarasota, FL 34236 USA*

*Chief Science Advisor, OCEARCH*

[rhuetter@mote.org](mailto:rhuetter@mote.org)  
Tel: 941-388-1827  
Fax: 941-388-4312  
More info at: [www.mote.org](http://www.mote.org)

On 9/26/2018 2:23 PM, MacDonald, Jennifer wrote:

Hi Bob,

In response to your email below, I want to clarify your interpretation of the statement "all White Sharks caught, up to 20, will have both acoustic and SPOT tags applied." This statement is included in the "Description of the Activity" section of your permit and is not to be interpreted as a directive from DFO to tag as many sharks as possible. This section of the permit is simply meant to outline the proposed activities, including specifics about how they may be carried out. This statement simply indicates that you requested to apply both types of tags on the same individuals, up to 20 sharks.

With respect to the condition placed on the total length for tagging, this was based on the best available science we had when we reviewed your application, including scientific advice that SPOT tags in particular may affect fin development in juveniles. Further, the condition to limit the size of sharks that can be tagged was consistent with your own permit request, which indicated that you were requesting to "sample up to 20 large animals in Canadian waters." In the information you submitted to our office on January 31<sup>st</sup>, you indicated that the power analysis you have completed indicated that a sample size of 60 individuals is required for the various studies you are undertaking globally (20 young-of-the-year (YOY), 20 immature and 20 mature individuals); you further indicated that you did not require additional tags on any YOY and that the Canadian expedition would be targeting large individuals.

All the permit conditions were determined based on the best available science we had at the time. It is not feasible to consider changing these on such short notice; to make changes would require further review, which could take several weeks.

However, one option that may be available, would be to amend condition 2.15 to specify that the restriction is in relation to SPOT tags. The decision to include this condition was based specifically on concerns about the attachment of SPOT tags on smaller individuals. As you indicate in your email, we are certainly interested in information on other age classes in Canadian waters, which could be attained from acoustic or PSAT tags. If this is something you would like us to consider, please advise me in writing of this.

Thank you,  
Jenn

**Jennifer MacDonald**  
Species at Risk Management Division  
(902) 407-8175

---

**From:** Robert Hueter [<mailto:rhoeter@mote.org>]  
**Sent:** September-26-18 12:11 PM  
**To:** MacDonald, Jennifer; [chris@oceanarch.org](mailto:chris@oceanarch.org)  
**Cc:** Gromack, Aimee  
**Subject:** Re: SARA Permit (207-17a) - amendment

Hi Jenn:

Thank you for this amendment, very much appreciate the quick turnaround on this. We're tied up at the dock in Lunenburg today with the weather coming through, but tomorrow afternoon and beyond are looking good, so we'll be back at it soon.

I just called your office and left you a voicemail. You can call me back at (941)302-0976. We have a question about our permit to tag as it relates to shark size. On page 2 of the SARA permit it states that, "All White Sharks caught, up to 20, will have both acoustic and SPOT tags applied." We've taken this as a directive to tag as many white sharks as possible here, up to 20, to maximize the data and learning from Canadian shark movement. As I think you know, in U.S. waters we've tagged everything from young-of-the-year (YOYs) to mature adults, with excellent results from their SPOT tags to fill in gaps in our knowledge of white shark life history. The two males we've tagged here so far had contour lengths and stretch total lengths of >3.5m, with total lengths just a bit under that mark. Can you provide the rationale for the 3.5m TL condition, so that we can understand what the concern there is? Please understand we do have a smaller version of the SPOT onboard to use on the very young animals -- we used this with our YOY studies off Long Island, NY. But we've found that the older juveniles through adults all tolerate the larger SPOT tag very well, and give us excellent data. I'm sure that DFO and COSEWIC wants data on all size classes of white sharks in Canadian waters, correct?

Please call me back as soon as possible, hopefully today while we're weather-bound, so that we can discuss this. We'd also like to fill you in on our exciting results with sharks Nova and Jefferson, and the sighting of another white shark earlier in the expedition. We love it here and everyone has been so welcoming!

Cheers,  
Bob

**ROBERT E. HUETER, Ph.D.**  
*Senior Scientist & Director, Center for Shark Research*  
*Perry W. Gilbert Chair in Shark Research*  
*Manager, Sharks & Rays Conservation Research Program*  
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On 9/26/2018 7:27 AM, MacDonald, Jennifer wrote:

Hello Bob and Chris,

I have attached the amendment to your *Species at Risk Act* Section 73 Permit as requested. The Location of Proposed Activity (page 1) has been amended to include all of the waters within the Maritimes Region of DFO. Note, that we also slightly modified condition 2.15. The condition still limits the size of sharks that may be tagged, but removed the condition in relation to capture of sharks only above a certain size. This was in recognition of the difficulty in accurately determining the size of a shark before it is caught.

As with the original permit, you should keep a printed copy of the signed permit onboard at all times and ensure all members of the research team are familiar with all of the conditions of the permit.

Thank you,  
Jenn

**Jennifer MacDonald**

Species at Risk Biologist | Biologiste des espèces en péril  
Species at Risk Management Division | Division de la gestion des espèces en péril  
Ecosystem Management | Gestion des écosystèmes  
Fisheries & Oceans Canada | Pêches & Océans Canada  
P.O. Box 1006 Dartmouth N.S. | C.P. 1006 Dartmouth N.E. B2Y 4A2  
Tel | Tél: (902) 407-8175 Fax | Téléc: (902) 426-2331  
Email | Courriel: [jennifer.macdonald@dfo-mpo.gc.ca](mailto:jennifer.macdonald@dfo-mpo.gc.ca)

## MacDonald, Jennifer

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**From:** Robert Hueter <rhuetter@mote.org>  
**Sent:** October-01-18 12:38 PM  
**To:** MacDonald, Jennifer; Chris Fischer  
**Cc:** Humphrey, Donald; Gromack, Aimee; Arni  
**Subject:** Re: SARA Permit (207-17a) - amendment

**Categories:** To file

Hi Jenn:

Thanks for your reply. Ideally we'd like to SPOT-tag all sharks we catch on this expedition. For very small sharks (likely not encountered here in NS), we have a small SPOT model that lasts only one year; we have deployed these successfully on YOY white sharks and gotten excellent results. For the size of sharks we're seeing here in NS, however, our larger 5-yr SPOT works very well and is readily accommodated on their dorsal fins.

I realize we first said only mature sharks last week, then walked that back when we got the 3.25m immature male yesterday that could have easily handled a SPOT. I looked back on our SARA permit app and the follow-up materials, and we said all along we need data from both the immature/subadult and the adult size classes. We never said we wanted to tag only the adults.

So our request is that the minimum size for a SPOT be removed entirely, and let us determine when to use the small one-year model, if ever during this expedition. Failing that, if the minimum size could be reduced to, say, 2.8m TL, that would hopefully cover the size range we're seeing here. This is all new discovery, that's what makes it so great, and so important!

If you need to discuss this, my cell is [REDACTED] We're fishing right now and there's a shark in the area. We have 10 days of fishing left in the expedition.

Thanks for all your help --  
Bob

**ROBERT E. HUETER, Ph.D.**

*Senior Scientist & Director, Center for Shark Research  
Perry W. Gilbert Chair in Shark Research  
Manager, Sharks & Rays Conservation Research Program  
Mote Marine Laboratory  
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On 10/1/2018 11:13 AM, MacDonald, Jennifer wrote:

Hello Bob and Chris,

Would you please clarify what you are asking DFO to consider as far as an amendment? In your initial messages last week, you raised concerns with 3.5m not being an accurate measure of sexual maturity and you asked that DFO consider amending the permit to utilize other measures of maturity, specifically calcified claspers, to allow for SPOT tagging of sexually mature individuals (including those that may be smaller than 3.5m).

You seem to now be asking that we consider a further amendment to allow tagging of both sexually mature and immature individuals. Before we can proceed further with reviewing this request, we will need clarification on whether you are requesting an amendment for SPOT tagging only mature individuals, or also immature individuals.

As you know, White Sharks are listed as Endangered here in Canada and therefore they are subject to an additional level of scrutiny before we can make such decisions. Specifically, if you are requesting that we consider SPOT tagging both immature and mature individuals, this could take additional time to evaluate.

If you would prefer to discuss this by phone, we can arrange to have a call with you this afternoon.

Thank you,  
Jenn

**Jennifer MacDonald**  
Species at Risk Management Division  
(902) 407-8175

---

**From:** Chris Fischer [<mailto:chris@ocearch.org>]  
**Sent:** September-30-18 6:27 PM  
**To:** Robert Hueter  
**Cc:** MacDonald, Jennifer; Humphrey, Donald; Gromack, Aimee; Ami  
**Subject:** Re: SARA Permit (207-17a) - amendment

Also a loss for public safety. Would be good to know if that shark is in populated swimming areas in real time.

Now we will not.

For anyone that is giving you advice on this issue, please account for any personal agendas or bias's they may have.

No spot tag on this shark was not shark first, ocean first, or public safety first.

It's fin was the same size as 3.7m Hal.

Hope we can talk tomorrow morning.

C

Chris Fischer  
Founding Chairman  
Ocearch  
[www.Ocearch.org](http://www.Ocearch.org)

On Sep 30, 2018, at 6:18 PM, Robert Hueter <[rhueter@mote.org](mailto:rhueter@mote.org)> wrote:

Hi folks:

Letting you know that we worked up an immature male this afternoon, with a TL of 3.25m and an STL of 3.44m. So as per DFO's wishes, we did not attach a SPOT tag to this shark, compromising the results for two of our collaborators' projects on this expedition. This shark therefore will not be on the Tracker for scientists and the public to follow.

As someone with more than 40 years of experience in shark field biology on more than 100 species, from tiny pups to massive whale sharks, I have to say this is a very sad waste of research capital. I know the fin on that animal was plenty large enough and nearing the end of its growth to not worry about the effects of a SPOT tag. I question the DFO scientists who called for the 3.5m TL limit and challenge them to provide concrete evidence this restriction is anything but arbitrary.

We did do a full work-up of this shark otherwise, including genetics, microbiology, stress physiology, and ecotoxicology, and we did insert an acoustic tag, but no SPOT.

So Jenn and Donald, I ask DFO to please eliminate or at least reduce the size limit on SPOT-tagging of the white sharks. We've clearly found an important hotspot for the species here in Nova Scotia, at least for the large males. To not track the sub-adult sharks' precise movements over the next 5 years, as they mature, is a loss for science, for conservation and for Canada. Hope to hear from you on Monday before we catch another shark, please.

Bob

**ROBERT E. HUETER, Ph.D.**

*Senior Scientist & Director, Center for Shark Research  
Perry W. Gilbert Chair in Shark Research  
Manager, Sharks & Rays Conservation Research Program  
Mote Marine Laboratory  
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*Chief Science Advisor, OCEARCH*

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Fax: 941-388-4312

More info at: [www.mote.org](http://www.mote.org)

On 9/29/2018 5:47 PM, Robert Hueter wrote:

Just letting you all know we sampled and tagged another mature male today, this one 3.9m TL and 4.0m STL, beautiful animal we named Hal for Halifax.

Awaiting your decision on our request about the 3.5m minimum when the workweek begins this Monday...

Best regards,  
Bob

**ROBERT E. HUETER, Ph.D.**

*Senior Scientist & Director, Center for Shark Research  
Perry W. Gilbert Chair in Shark Research  
Manager, Sharks & Rays Conservation Research Program  
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**Fax: 941-388-4312**

**More info at: [www.mote.org](http://www.mote.org)**

On 9/26/2018 5:06 PM, Robert Hueter wrote:

Hi Jenn & Donald:

Pursuant to this discussion I'm attaching a 2011 paper by Oliver Jewell et al. which concluded that, even though long-term SPOT tagging can cause cosmetic and structural changes to a white shark's dorsal fin, it leads to, in their words, "little compromise on the animal's long term survival and resultant body growth." In other words, the SPOT tags might deform the fins that are still growing, but this doesn't significantly affect the animal's life. As we know, sharks are extremely resilient to wounding and commonly experience compromises to their skin and fins, for example, during mating. Their remarkable healing response to these wounds allows them to continue on with their lives with no effect. In our SARA permit application, we included photos previously SPOT-tagged and healed white sharks in Mexico, and all showed normal body size and function after release of the tags.

Also, we reviewed our database of white sharks studied by OCEARCH, and of our mature males, two were less than 3.5 m TL, the smaller one being 2.99 m TL. So they can mature at less than 3.5 m. One of our two Nova Scotia sharks, Nova, had a stretch total length of more than 3.5 m but the longitudinal total length was 3.41 m, and he had calcified claspers. Our other NS shark Jefferson was 3.86 m TL and also had calcified claspers. Size at maturity is not a knife-edge number but is a range in a species, and clearly these sharks can mature at less than 3.5 m.



So if we could agree on a clarification that we may SPOT-tag only the mature sharks, rather than an arbitrary TL minimum of 3.5 m, that should work for all. Substituting PSAT-tagging for SPOT-tagging is not a solution, as the geolocation tracking data from the PSATs are far less accurate and precise than the SPOT tag data. These are two different tools, with the value of the PSATs being more in their depth and temperature data. Our questions about white sharks in Canada involve such things as the locations of mating sites and pupping areas, for which we need the SPOT tag data.

I hope that helps with your deliberations. We are tied up to the dock through tomorrow morning but are hoping the weather will break by noon and allow us to head out to the fishing grounds again tomorrow afternoon. Donald, we hope to see you on the ship soon, and thank you both again for your help with our research.

Best regards,

Bob

Cell [REDACTED]

**ROBERT E. HUETER, Ph.D.**

*Senior Scientist & Director, Center for Shark Research*

*Perry W. Gilbert Chair in Shark Research*

*Manager, Sharks & Rays Conservation Research Program*

*Mote Marine Laboratory*

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On 9/26/2018 3:09 PM, Robert Hueter wrote:

Hi Jenn -

It seems the confusion lies with the interpretation of "large sharks." Yes, we have no need to SPOT-tag any more YOYs, and yes, we are here in Nova Scotia looking for mature adults. But white sharks can mature

at substantially less than 3.5m TL, as we've seen in our own data. I'm quite sure we never put in our application anything about limiting our tagging to sharks >3.5m. That's a size that OCEARCH has rarely encountered ever, even in other locations. I sent Aimee a table of length/girth measurements yesterday, and only eight sharks were >3.5m TL, from our global database of ~150 white sharks.

The scientific advice that SPOT tags might significantly affect the animals is debatable, but in any case would only apply to the very young age classes, not the large sub-adults and adults. So that's a moot point here. If we're restricted in our ability to put SPOT tags on the large sharks, it doesn't kill our entire research agenda, which as you know includes 15 different projects for 29 principal investigators from 16 Canadian and US institutions. But it greatly hampers our knowledge and severely curtails our engagement with the public, who follow this work on the Shark Tracker. We'll be forced to explain to the public why we're not SPOT-tagging the other large sharks.

Would this be a possible solution: Could the SARA permit be modified expeditiously to replace ">3.5m TL sharks" with simply "sexually mature sharks"? We can agree to put SPOT tags only on mature animals here in Canada this expedition. Would that work for you?

Standing by.... We're ready to have a phone call on this ASAP. Again my number on the ship is [REDACTED]

Bob

**ROBERT E. HUETER, Ph.D.**

*Senior Scientist & Director, Center for Shark Research*

*Perry W. Gilbert Chair in Shark Research*

*Manager, Sharks & Rays Conservation Research Program*

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On 9/26/2018 2:23 PM, MacDonald, Jennifer wrote:

Hi Bob,

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With respect to the condition placed on the total length for tagging, this was based on the best available science we had when we reviewed your application, including scientific advice that SPOT tags in particular may affect fin development in juveniles. Further, the condition to limit the size of sharks that can be tagged was consistent with your own permit request, which indicated that you were requesting to "sample up to 20 large animals in Canadian waters." In the information you submitted to our office on January 31<sup>st</sup>, you indicated that the power analysis you have completed indicated that a sample size of 60 individuals is required for the various studies you are undertaking globally (20 young-of-the-year (YOY), 20 immature and 20 mature individuals); you further indicated that you did not require additional tags on any YOY and that the Canadian expedition would be targeting large individuals.

All the permit conditions were determined based on the best available science we had at the time. It is not feasible

to consider changing these on such short notice; to make changes would require further review, which could take several weeks.

However, one option that may be available, would be to amend condition 2.15 to specify that the restriction is in relation to SPOT tags. The decision to include this condition was based specifically on concerns about the attachment of SPOT tags on smaller individuals. As you indicate in your email, we are certainly interested in information on other age classes in Canadian waters, which could be attained from acoustic or PSAT tags. If this is something you would like us to consider, please advise me in writing of this.

Thank you,  
Jenn

**Jennifer MacDonald**  
Species at Risk  
Management Division  
(902) 407-8175

---

**From:** Robert Hueter  
[mailto:[rhuetter@mote.org](mailto:rhuetter@mote.org)]  
**Sent:** September-26-18 12:11 PM  
**To:** MacDonald, Jennifer;  
[chris@oceanresearch.org](mailto:chris@oceanresearch.org)  
**Cc:** Gromack, Aimee  
**Subject:** Re: SARA

Hi Jenn:

Thank you for this amendment, very much appreciate the quick turnaround on this. We're tied up at the dock in Lunenburg today with the weather coming through, but tomorrow afternoon and beyond are looking good, so we'll be back at it soon.

I just called your office and left you a voicemail. You can call me back at [REDACTED]

[REDACTED] We have a question about our permit to tag as it relates to shark size. On page 2 of the SARA permit it states that, "All White Sharks caught, up to 20, will have both acoustic and SPOT tags applied." We've taken this as a directive to tag as many white sharks as possible here, up to 20, to maximize the data and learning from Canadian shark movement. As I think you know, in U.S. waters we've tagged everything from young-of-the-year (YOYs) to mature adults, with excellent results from their SPOT tags to fill in gaps in our knowledge of white shark life history. The two males we've tagged here so far had contour lengths

and stretch total lengths of >3.5m, with total lengths just a bit under that mark. Can you provide the rationale for the 3.5m TL condition, so that we can understand what the concern there is? Please understand we do have a smaller version of the SPOT onboard to use on the very young animals – we used this with our YOY studies off Long Island, NY. But we've found that the older juveniles through adults all tolerate the larger SPOT tag very well, and give us excellent data. I'm sure that DFO and COSEWIC wants data on all size classes of white sharks in Canadian waters, correct?

Please call me back as soon as possible, hopefully today while we're weather-bound, so that we can discuss this. We'd also like to fill you in on our exciting results with sharks Nova and Jefferson, and the sighting of another white shark earlier in the expedition. We love it here and everyone has been so welcoming!

Cheers,  
Bob

**ROBERT E. HUETER,  
Ph.D.**

*Senior Scientist &  
Director, Center for Shark  
Research  
Perry W. Gilbert Chair in  
Shark Research  
Manager, Sharks & Rays  
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*Chief Science Advisor,  
OCEARCH*

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Tel: 941-388-1827  
Fax: 941-388-4312  
More info  
at: [www.mote.org](http://www.mote.org)

On 9/26/2018 7:27  
AM, MacDonald,  
Jennifer wrote:

Hello  
Bob  
and  
Chris,

I have  
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## NOTE TO FILE

FILE NUMBER - NUMÉRO DE DOSSIER

CALL IN		CALL OUT		SITE VISIT		NOTE	X	TIME HEURE	DATE (Y-A - M - D-J)
NAMES OF PERSON(S) CONTACTED NOM(S) DE LA (DES) PERSONNE(S) CONTACTÉE(S)									2018-10-01
Meeting with Donald Humphrey, Heidi Schaefer, Aimee Gromack									
SUBJECT - OBJET									
Request by OCEARCH to amend permit to allow for SPOT tagging of individuals less than 3.5m									
SUMMARY - RESUME									
<ul style="list-style-type: none"><li>Request for amendment from OCEARCH is conflicting; there is a need to clarify if they are requesting the ability to SPOT tag mature individuals (but that are less than 3.5m) or also immature individuals.</li><li>Discussed possible additional conditions we could require – images of calcified claspers; images in the permit report (geolocated and date stamped)</li><li>Noted that females mature at a larger size than males; current condition does not differentiate between males and females.</li><li>Next steps – follow-up call with OCEARCH; key messages:<ul style="list-style-type: none"><li>We were already internally discussing amending the permit to allow for other methods of identifying maturity (e.g., if there is evidence of calcified claspers, but the shark is smaller than 3.5 m, this could be considered mature and SPOT tags could be allowed)</li><li>Now, it seems that something else is being requested; this is going to take additional time to evaluate</li><li>The process/restrictions in the SARA permit should not be compared to what is permitted/allowed in other jurisdictions; stress that White Sharks are EN in Canada; therefore there is an extra level of scrutiny given their status</li></ul></li></ul>									
CONCLUSION - CONCLUSIONS				ACTION TAKEN - SUITE DONNÉE				ACTION REQUIRED - SUITE À DONNER	
Call Bob Heuter									
RECORDED BY ENREGISTRÉ PAR		NAME - NOM Jennifer MacDonald			DIVISION - DIVISION Species at Risk Management Division			TELEPHONE - TÉLÉPHONE 902-407-8175	



## NOTE TO FILE

FILE NUMBER - NUMÉRO DE DOSSIER

CALL IN		CALL OUT	X	SITE VISIT		NOTE		TIME HEURE	DATE (Y-A - M - D-J)
NAMES OF PERSON(S) CONTACTED NOM(S) DE LA (DES) PERSONNE(S) CONTACTÉE(S)									2018-10-01
Bob Heuter, OCEARCH									
SUBJECT - OBJET									
Follow-up to request to amend permit									
SUMMARY - RÉSUMÉ									
<ul style="list-style-type: none"><li>I called Bob following our internal meeting to discuss next steps</li><li>Asked Bob to clarify intent of request to amend permit – just mature individuals (although may be less than 3.5m) or immature individuals?<ul style="list-style-type: none"><li>Bob indicated they would like to SPOT tag all white sharks they catch</li></ul></li><li>Asked Bob how many immature individuals they would like to tag and how many they anticipate encountering over the remainder of their expedition<ul style="list-style-type: none"><li>Bob indicated that given there are 10 days left in the expedition; they are finding sharks about every other day, they expect to encounter possibly 4-5 more; of those, maybe 2-3 would be immature.</li></ul></li><li>Bob reiterated OCEARCH rationale that maturity can be determined by calcified claspers<ul style="list-style-type: none"><li>Sharks tagged so far – Hal and Jefferson were both mature</li><li>The 4<sup>th</sup> shark that they caught, but which they did not apply a SPOT tag to; it was total length – 3.25m, but the fin size was similar to Nova</li></ul></li><li>Bob stated that while he recognizes these are EN species, they are also a species that gets wounded frequently and they are designed to withstand that.</li><li>Bob indicated he would be find with drawing the limit at tagging only mature, but would prefer that no restrictions were placed on the tagging</li><li>Bob flagged concerns with using the size of maturity as published in scientific literature; he feels this is not a black and white figure that holds in all locations.</li></ul>									
CONCLUSION - CONCLUSIONS			ACTION TAKEN - SUITE DONNÉE			ACTION REQUIRED - SUITE À DONNER			
N/A									
RECORDED BY ENREGISTRÉ PAR	NAME - NOM Jennifer MacDonald			DIVISION - DIVISION Species at Risk Management Division			TELEPHONE - TÉLÉPHONE 902-407-8175		

## MacDonald, Jennifer

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**From:** Gromack, Aimee  
**Sent:** October-01-18 1:43 PM  
**To:** MacDonald, Jennifer; Humphrey, Donald; Schaefer, Heidi  
**Subject:** RE: SARA Permit (207-17a) - amendment

**Categories:** To file

Hi Everyone,

FYI, below is some data I compiled for YOY sharks SPOT-tagged by OCEARCH. I believe this is most, if not all YOY whites tagged in the NW Atlantic by OCEARCH. I don't know if there are any whites this small in NS, they are likely larger than this. Unfortunately, it doesn't appear that OCEARCH tagged any White Sharks in the 6-10 foot range (1.8 – 3.0 m) in the NW Atlantic. I am a bit concerned with this data below - notice that many of these small sharks did not ping for much more than a month, two of them have not pinged since being tagged. The small SPOT-tags that used on them have battery life of a year. It is possible that their life history is such that they stay away from the surface at this age. Perhaps if they apply for a permit next year, OCEARCH can provide PSAT track data on some of these sharks, or other evidence that the lack of pings is not a matter of concern.

Aimee

YOY Shark Name	Length (ft)	Length (m)	Weight (lbs)	Date Tagged	Date of Last Ping	Days pinging
Hampton	4'5"	1.35	42	22-Aug-16	19-Sep-16	2
Gotham	5'1"	1.55	30.9	23-Aug-16	31-Aug-16	
Laurel Jean	6'	1.83	82.5	26-Aug-17	05-Sep-17	1
Azlyn	5'1"	1.55	69.5	23-Aug-17	25-Sep-17	3
JD	5'4"	1.63	74.2	15-Aug-17	11-Oct-17	5
Finn	5'	1.52	79.2	13-Aug-17	18-Sep-17	3
Amagansett	5'4"	1.63	91.5	21-Aug-17	15-Sep-17	2
Mission	5'8"	1.73	66.5	19-Aug-17	03-Nov-17	7
Brunswick	4'	1.22	54.8	22-Aug-16	no data	
Sage	5'4"	1.63	94.4	25-Aug-17	no data	
Gratitude	5'3"	1.60	74.4	24-Aug-17	19-Nov-17	8
Hudson	5'1"	1.55	66.7	19-Aug-16	09-Nov-16	8
Montauk	4'6"	1.37	50	19-Aug-16	27-Dec-16	13
Bruin	5'5"	1.65	101	13-Aug-17	07-Mar-18	20
Gurney	4'5"	1.35	61.6	12-Aug-17	27-Feb-18	19

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**From:** MacDonald, Jennifer  
**Sent:** October-01-18 12:13 PM  
**To:** Chris Fischer; Robert Hueter

**Cc:** Humphrey, Donald; Gromack, Aimee; Ami  
**Subject:** RE: SARA Permit (207-17a) - amendment

Hello Bob and Chris,

Would you please clarify what you are asking DFO to consider as far as an amendment? In your initial messages last week, you raised concerns with 3.5m not being an accurate measure of sexual maturity and you asked that DFO consider amending the permit to utilize other measures of maturity, specifically calcified claspers, to allow for SPOT tagging of sexually mature individuals (including those that may be smaller than 3.5m).

You seem to now be asking that we consider a further amendment to allow tagging of both sexually mature and immature individuals. Before we can proceed further with reviewing this request, we will need clarification on whether you are requesting an amendment for SPOT tagging only mature individuals, or also immature individuals.

As you know, White Sharks are listed as Endangered here in Canada and therefore they are subject to an additional level of scrutiny before we can make such decisions. Specifically, if you are requesting that we consider SPOT tagging both immature and mature individuals, this could take additional time to evaluate.

If you would prefer to discuss this by phone, we can arrange to have a call with you this afternoon.

Thank you,  
Jenn

**Jennifer MacDonald**  
Species at Risk Management Division  
(902) 407-8175

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**From:** Chris Fischer [mailto:chris@ocearch.org]  
**Sent:** September-30-18 6:27 PM  
**To:** Robert Hueter  
**Cc:** MacDonald, Jennifer; Humphrey, Donald; Gromack, Aimee; Ami  
**Subject:** Re: SARA Permit (207-17a) - amendment

Also a loss for public safety. Would be good to know if that shark is in populated swimming areas in real time. Now we will not.

For anyone that is giving you advice on this issue, please account for any personal agendas or bias's they may have. No spot tag on this shark was not shark first, ocean first, or public safety first.

It's fin was the same size as 3.7m Hal.

Hope we can talk tomorrow morning.

C



Chris Fischer  
Founding Chairman  
Ocearch  
[www.Ocearch.org](http://www.Ocearch.org)

On Sep 30, 2018, at 6:18 PM, Robert Hueter <[rhuetter@mote.org](mailto:rhuetter@mote.org)> wrote:



Hi folks:

Letting you know that we worked up an immature male this afternoon, with a TL of 3.25m and an STL of 3.44m. So as per DFO's wishes, we did not attach a SPOT tag to this shark, compromising the results for two of our collaborators' projects on this expedition. This shark therefore will not be on the Tracker for scientists and the public to follow.

As someone with more than 40 years of experience in shark field biology on more than 100 species, from tiny pups to massive whale sharks, I have to say this is a very sad waste of research capital. I know the fin on that animal was plenty large enough and nearing the end of its growth to not worry about the effects of a SPOT tag. I question the DFO scientists who called for the 3.5m TL limit and challenge them to provide concrete evidence this restriction is anything but arbitrary.

We did do a full work-up of this shark otherwise, including genetics, microbiology, stress physiology, and ecotoxicology, and we did insert an acoustic tag, but no SPOT.

So Jenn and Donald, I ask DFO to please eliminate or at least reduce the size limit on SPOT-tagging of the white sharks. We've clearly found an important hotspot for the species here in Nova Scotia, at least for the large males. To not track the sub-adult sharks' precise movements over the next 5 years, as they mature, is a loss for science, for conservation and for Canada. Hope to hear from you on Monday before we catch another shark, please.

Bob

**ROBERT E. HUETER, Ph.D.**

*Senior Scientist & Director, Center for Shark Research  
Perry W. Gilbert Chair in Shark Research  
Manager, Sharks & Rays Conservation Research Program  
Mote Marine Laboratory  
1600 Ken Thompson Parkway  
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[rhuetter@mote.org](mailto:rhuetter@mote.org)

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More info at: [www.mote.org](http://www.mote.org)

On 9/29/2018 5:47 PM, Robert Hueter wrote:

Just letting you all know we sampled and tagged another mature male today, this one 3.9m TL and 4.0m STL, beautiful animal we named Hal for Halifax.

Awaiting your decision on our request about the 3.5m minimum when the workweek begins this Monday...

Best regards,  
Bob

**ROBERT E. HUETER, Ph.D.**

*Senior Scientist & Director, Center for Shark Research  
Perry W. Gilbert Chair in Shark Research*

Manager, Sharks & Rays Conservation Research Program  
Mote Marine Laboratory  
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On 9/26/2018 5:06 PM, Robert Hueter wrote:

Hi Jenn & Donald:

Pursuant to this discussion I'm attaching a 2011 paper by Oliver Jewell et al. which concluded that, even though long-term SPOT tagging can cause cosmetic and structural changes to a white shark's dorsal fin, it leads to, in their words, "little compromise on the animal's long term survival and resultant body growth." In other words, the SPOT tags might deform the fins that are still growing, but this doesn't significantly affect the animal's life. As we know, sharks are extremely resilient to wounding and commonly experience compromises to their skin and fins, for example, during mating. Their remarkable healing response to these wounds allows them to continue on with their lives with no effect. In our SARA permit application, we included photos previously SPOT-tagged and healed white sharks in Mexico, and all showed normal body size and function after release of the tags.

Also, we reviewed our database of white sharks studied by OCEARCH, and of our mature males, two were less than 3.5 m TL, the smaller one being 2.99 m TL. So they can mature at less than 3.5 m. One of our two Nova Scotia sharks, Nova, had a stretch total length of more than 3.5 m but the longitudinal total length was 3.41 m, and he had calcified claspers. Our other NS shark Jefferson was 3.86 m TL and also had calcified claspers. Size at maturity is not a knife-edge number but is a range in a species, and clearly these sharks can mature at less than 3.5 m.

So if we could agree on a clarification that we may SPOT-tag only the mature sharks, rather than an arbitrary TL minimum of 3.5 m, that should work for all. Substituting PSAT-tagging for SPOT-tagging is not a solution, as the geolocation tracking data from the PSATs are far less accurate and precise than the SPOT tag data. These are two different tools, with the value of the PSATs being more in their depth and temperature data. Our questions about white sharks in Canada involve such things as the locations of mating sites and pupping areas, for which we need the SPOT tag data.

I hope that helps with your deliberations. We are tied up to the dock through tomorrow morning but are hoping the weather will break by noon and allow us to head out to the fishing grounds again tomorrow afternoon. Donald, we hope to see you on the ship soon, and thank you both again for your help with our research.

Best regards,

Bob

Cell 

**ROBERT E. HUETER, Ph.D.**

*Senior Scientist & Director, Center for Shark Research*

*Perry W. Gilbert Chair in Shark Research*

*Manager, Sharks & Rays Conservation Research Program*

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On 9/26/2018 3:09 PM, Robert Hueter wrote:

Hi Jenn -

It seems the confusion lies with the interpretation of "large sharks." Yes, we have no need to SPOT-tag any more YOYs, and yes, we are here in Nova Scotia looking for mature adults. But white sharks can mature at substantially less than 3.5m TL, as we've seen in our own data. I'm quite sure we never put in our application anything about limiting our tagging to sharks >3.5m. That's a size that OCEARCH has rarely encountered ever, even in other locations. I sent Aimee a table of length/girth measurements yesterday, and only eight sharks were >3.5m TL, from our global database of ~150 white sharks.

The scientific advice that SPOT tags might significantly affect the animals is debatable, but in any case would only apply to the very young age classes, not the large sub-adults and adults. So that's a moot point here. If we're restricted in our ability to put SPOT tags on the large sharks, it doesn't kill our entire research agenda, which as

you know includes 15 different projects for 29 principal investigators from 16 Canadian and US institutions. But it greatly hampers our knowledge and severely curtails our engagement with the public, who follow this work on the Shark Tracker. We'll be forced to explain to the public why we're not SPOT-tagging the other large sharks.

Would this be a possible solution: Could the SARA permit be modified expeditiously to replace ">3.5m TL sharks" with simply "sexually mature sharks"? We can agree to put SPOT tags only on mature animals here in Canada this expedition. Would that work for you?

Standing by.... We're ready to have a phone call on this ASAP. Again my number on the ship is

Bob

**ROBERT E. HUETER, Ph.D.**

*Senior Scientist & Director, Center for Shark Research  
Perry W. Gilbert Chair in Shark Research  
Manager, Sharks & Rays Conservation Research Program  
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On 9/26/2018 2:23 PM, MacDonald, Jennifer wrote:

Hi Bob,

In response to your email below, I want to clarify your interpretation of the statement "all White Sharks caught, up to 20, will have both acoustic and SPOT tags applied." This statement is included in the "Description of the Activity" section of your permit and is not to be interpreted as a directive from DFO to tag as many sharks as possible. This section of the permit is simply meant to outline the proposed activities, including specifics about how

they may be carried out. This statement simply indicates that you requested to apply both types of tags on the same individuals, up to 20 sharks.

With respect to the condition placed on the total length for tagging, this was based on the best available science we had when we reviewed your application, including scientific advice that SPOT tags in particular may affect fin development in juveniles. Further, the condition to limit the size of sharks that can be tagged was consistent with your own permit request, which indicated that you were requesting to "sample up to 20 large animals in Canadian waters." In the information you submitted to our office on January 31<sup>st</sup>, you indicated that the power analysis you have completed indicated that a sample size of 60 individuals is required for the various studies you are undertaking globally (20 young-of-the-year (YOY), 20 immature and 20 mature individuals); you further indicated that you did not require additional tags on any YOY and that the Canadian expedition would be targeting large individuals.

All the permit conditions were determined based on the best available science we had at the time. It is not feasible to consider changing these on such short notice; to make changes would require further review, which could take several weeks.

However, one option that may be available, would be to amend condition 2.15 to specify that the restriction is in relation to SPOT tags. The decision to include this condition was based specifically on concerns about the attachment of SPOT tags on smaller individuals. As you indicate in your email, we are certainly interested in information on other age classes in Canadian waters, which could be attained from acoustic or PSAT tags. If

this is something you would like us to consider, please advise me in writing of this.

Thank you,  
Jenn

**Jennifer MacDonald**  
Species at Risk Management Division  
(902) 407-8175

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**From:** Robert Hueter  
[mailto:[rhueter@mote.org](mailto:rhueter@mote.org)]  
**Sent:** September-26-18 12:11 PM  
**To:** MacDonald, Jennifer;  
[chris@oceanarch.org](mailto:chris@oceanarch.org)  
**Cc:** Gromack, Aimee  
**Subject:** Re: SARA Permit (207-17a) - amendment

Hi Jenn:

Thank you for this amendment, very much appreciate the quick turnaround on this. We're tied up at the dock in Lunenburg today with the weather coming through, but tomorrow afternoon and beyond are looking good, so we'll be back at it soon.

I just called your office and left you a voicemail. You can call me back at [REDACTED] We have a question about our permit to tag as it relates to shark size. On page 2 of the SARA permit it states that, "All White Sharks caught, up to 20, will have both acoustic and SPOT tags applied." We've taken this as a directive to tag as many white sharks as possible here, up to 20, to maximize the data and learning from Canadian shark movement. As I think you know, in U.S. waters we've tagged everything from young-of-the-year (YOYs) to mature adults, with excellent results from their SPOT tags to fill in gaps in our knowledge of white shark life history. The two males we've tagged here so far had contour lengths and stretch total lengths of >3.5m, with total lengths just a bit under that mark. Can you provide the rationale

for the 3.5m TL condition, so that we can understand what the concern there is? Please understand we do have a smaller version of the SPOT onboard to use on the very young animals -- we used this with our YOY studies off Long Island, NY. But we've found that the older juveniles through adults all tolerate the larger SPOT tag very well, and give us excellent data. I'm sure that DFO and COSEWIC wants data on all size classes of white sharks in Canadian waters, correct?

Please call me back as soon as possible, hopefully today while we're weather-bound, so that we can discuss this. We'd also like to fill you in on our exciting results with sharks Nova and Jefferson, and the sighting of another white shark earlier in the expedition. We love it here and everyone has been so welcoming!

Cheers,  
Bob

**ROBERT E. HUETER, Ph.D.**

*Senior Scientist & Director, Center for Shark Research*

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On 9/26/2018 7:27 AM,  
MacDonald, Jennifer wrote:

Hello Bob and Chris,

I have attached the  
amendment to your  
*Species at Risk Act*  
Section 73 Permit as

requested. The Location of Proposed Activity (page 1) has been amended to include all of the waters within the Maritimes Region of DFO. Note, that we also slightly modified condition 2.15. The condition still limits the size of sharks that may be tagged, but removed the condition in relation to capture of sharks only above a certain size. This was in recognition of the difficulty in accurately determining the size of a shark before it is caught.

As with the original permit, you should keep a printed copy of the signed permit onboard at all times and ensure all members of the research team are familiar with all of the conditions of the permit.

Thank you,  
Jenn

**Jennifer MacDonald**  
Species at Risk Biologist  
| Biologiste des  
espèces en peril  
Species at Risk  
Management Division |  
Division de la gestion  
des espèces en péril  
Ecosystem  
Management | Gestion  
des écosystèmes  
Fisheries & Oceans  
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## MacDonald, Jennifer

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**From:** Gromack, Aimee  
**Sent:** October-01-18 3:37 PM  
**To:** MacDonald, Jennifer  
**Subject:** RE: OCEARCH permit amendment

This looks good to me, Jenn. I don't have any further comments.

**From:** MacDonald, Jennifer  
**Sent:** October-01-18 3:32 PM  
**To:** Gromack, Aimee  
**Subject:** RE: OCEARCH permit amendment

Thanks again Aimee – your input is greatly appreciated!

Rather than send you the whole review document, here is the text I added. This document is internal only and meant to document our rationale and consideration of the SARA conditions for permitting. If you have a chance to look at this, that would be wonderful. Thanks!!

- as the impact on fin development of attaching SPOT tags has been shown to be greater in juvenile sharks<sup>[1]</sup>, the original permit limited tagging to individuals greater than 3.5 m total length, based on published data on size at maturity for males. The condition was re-evaluated upon a request from OCEARCH to consider SPOT tagging of both immature and mature individuals, as well as to reconsider how maturity in White Sharks is determined.
- While length (based on published data on size at maturity) is considered by some scientists to be the best tool to determine maturity in the field; in males, evidence of calcification of the claspers is also a good indication of maturity. Therefore, the permit condition is amended to indicate that mature white sharks may be tagged and that maturity is defined as being either greater than 3.5 m total length or the presence of calcified claspers.
- The permit is further amended to allow up to 3 immature White Sharks to be tagged with SPOT tags (individuals that are less than 3.5 m total length and do not have calcified claspers):
  - Although tagging juvenile sharks may lead to permanent impacts on fin development, there does not seem to be an impact on survival<sup>[2]</sup>.
  - While survival does not seem to be impacted, it is unknown if there are long-term impacts on fitness. In an extreme example, if the application of a SPOT tag on a smaller individual did lead to a reduction in fitness that was severe enough as to affect reproduction; this could be thought of as equating to a loss of that individual from the reproducing population (similar to a mortality).
  - The draft exemption in the Recovery Strategy allows for up to 3 mortalities/year for 2 consecutive years (and a maximum of 10 mortalities over 10 years) based on an assessment of the allowable harm for the species.
  - Therefore, although impacts on fitness are unknown, if tagging smaller individuals did have an impact on fitness, by limiting the application of SPOT tags to 3 immature individuals, this would be unlikely to jeopardize survival and recovery, as any potential impacts would still fall within the allowable harm for the species.

**Jennifer MacDonald**  
Species at Risk Management Division  
(902) 407-8175

**From:** Gromack, Aimee  
**Sent:** October-01-18 2:42 PM  
**To:** MacDonald, Jennifer  
**Subject:** RE: OCEARCH permit amendment

I made a few minor comments. I will come by to chat in a few minutes after you've had a chance to read them.

**From:** MacDonald, Jennifer  
**Sent:** October-01-18 2:28 PM  
**To:** Gromack, Aimee  
**Subject:** OCEARCH permit amendment

Would you mind taking a look at this and seeing if this is clear (the changes are in track changes):

R:\Oceans & Habitat\Species at Risk\Permitting\1-Permits\2017\17-WS-Fischer-Ocearch\4 PERMIT\3 Amendment – length\SARA-Permit-2017-07(OCEARCH)-Amendment2.doc

Thanks!!

**Jennifer MacDonald**

Species at Risk Biologist | Biologiste des espèces en péril  
Species at Risk Management Division | Division de la gestion des espèces en péril  
Ecosystem Management | Gestion des écosystèmes  
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Email | Courriel: [jennifer.macdonald@dfo-mpo.gc.ca](mailto:jennifer.macdonald@dfo-mpo.gc.ca)

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<sup>[1]</sup> Jewell et al. 2011

<sup>[2]</sup> Jewell et al. 2011

## MacDonald, Jennifer

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**From:** Schaefer, Heidi  
**Sent:** October-01-18 5:35 PM  
**To:** Humphrey, Donald  
**Subject:** Fw: OCEARCH permit amendment

Hi, I had to leave before reviewing this. I can look at it first thing tomorrow, or if you'd rather just look at it tonight due to urgency, that's fine with me. Let me know your preference.

Thanks,  
Heidi

Sent from my BlackBerry 10 smartphone on the Rogers network.

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**From:** MacDonald, Jennifer <[Jennifer.MacDonald@dfo-mpo.gc.ca](mailto:Jennifer.MacDonald@dfo-mpo.gc.ca)>  
**Sent:** Monday, October 1, 2018 3:45 PM  
**To:** Schaefer, Heidi  
**Subject:** RE: OCEARCH permit amendment

Hi Heidi,

I have also updated the approval and assessment form, saved here: [R:\Oceans & Habitat\Species at Risk\Permitting\1-Permits\2017\17-WS-Fischer-Ocearch\3 REVIEW\2 Amendment](#).

All the text highlighted in yellow is new text added to the original form.

Thanks,  
Jenn

**Jennifer MacDonald**  
Species at Risk Management Division  
(902) 407-8175

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**From:** MacDonald, Jennifer  
**Sent:** October-01-18 3:18 PM  
**To:** Schaefer, Heidi  
**Subject:** OCEARCH permit amendment

Hi Heidi,

I spoke with Donald following the email from Bob Heuter (attached) and a follow-up phone call with him; OCEARCH is requesting an amendment to tag both mature and immature individuals. Based on Donald's input on the direction to go, I drafted an amendment to the permit to adjust the condition to allow for tagging of both (mature individuals and a limited number of immature individuals). The permit is [here](#). All the changes are shown in track changes.

I'm working on updating the Assessment and Approval form to record the decision; Donald indicated he was fine with receiving the amended permit language and then following up with the amended review form. Once you have reviewed the amended permit, I can print a clean version for Donald's signature.

Thanks,  
Jenn

**Jennifer MacDonald**  
Species at Risk Biologist | Biologiste des espèces en péril  
Species at Risk Management Division | Division de la gestion des espèces en péril  
Ecosystem Management | Gestion des écosystèmes

Fisheries & Oceans Canada | Pêches & Océans Canada  
P.O. Box 1006 Dartmouth N.S. | C.P. 1006 Dartmouth N.E. B2Y 4A2  
Tel | Tél: (902) 407-8175 Fax | Téléc: (902) 426-2331  
Email | Courriel: [jennifer.macdonald@dfo-mpo.gc.ca](mailto:jennifer.macdonald@dfo-mpo.gc.ca)



Fisheries and Oceans Pêches et Océans  
Canada Canada

SARA Permit No: DFO-MAR-2017-17b

## PERMIT ISSUED UNDER SECTION 73 OF THE *SPECIES AT RISK ACT*

Subject to the conditions described in this permit, the holder of this permit ("Permit Holder"), or any qualified person acting under the authority of the Permit Holder, is authorized under the authority of subsection 73(1) of the *Species at Risk Act*, S.C. 2002, c.29 (SARA) to engage in activities (as described in this permit) that **harm, harass, capture, and possess** individuals of the following threatened or endangered aquatic species listed on Schedule 1 of SARA:

**White Shark** (*Carcharodon carcharias*), Atlantic population

### Permit issued to:

Name: OCEARCH ("Permit Holder")  
Attention to: George Christopher Fischer  
Address: 1790 Bonanza Drive, Suite 101B  
Park City, Utah, USA 84060  
Email: [chris@ocearch.org](mailto:chris@ocearch.org)  
Phone: (435) 645-8990 (office) [redacted] cellular)

The following individual operating under the authority of OCEARCH as "Permit Holder", and those under his supervision, may undertake the activities authorized by this permit:

Name	Organization
Robert Hueter	Mote Marine Laboratory

### Location of Proposed Activity

This permit is only valid at the following location(s):

Nearest community (city, town, village): N/A

Municipality, district, township, county: N/A

Province: N/A

Name of watercourse(s), waterbody(ies): Atlantic Ocean

Specific location: Within the Maritimes Region of Fisheries and Oceans Canada

### Valid Permit Period

This permit is valid from **August 1, 2018** until **November 30, 2018**

The permit was modified (Amendment 1) on **September 25, 2018**.

The permit was modified (Amendment 2) on **October 1, 2018**.

If the Permit Holder cannot complete the activity during this period, Fisheries and Oceans Canada (DFO) must be notified in advance of the expiration of the time period, as soon as the Permit Holder is aware.

The period during which other conditions of this permit must be complied with are provided in their respective sections below. DFO may, where appropriate, amend this permit. In cases where the Valid Permit Period is extended, written notice and/or an amended permit will be provided to the Permit Holder.

Canada

.../2

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### Description of the Activity

The purpose of the activity is to conduct scientific research on White Sharks in Canadian waters to gain a better understanding of the role of Canadian waters in the life history of the White Shark population in the northwest Atlantic Ocean, the range of the species within Canadian waters and health of White Sharks. The researchers will attach acoustic and satellite tags, as well as collect various biological samples, from up to 20 sharks in Canadian waters.

The study area includes:

- Mahone Bay;
- Bay of Fundy; and
- Scotian Shelf.

Researchers will use chum to attract White Sharks in the study area to the fishing boat and larger research vessel. When a White Shark is sighted, either visually or using a drone, the fishing boat will target its fishing activities to attract and capture that shark. Chum bags, chum boxes, bait tanks, chum tubes and decoys may all be used to attract White Sharks to the fishing vessel. Once a White Shark is in the vicinity of the fishing vessel, the researchers will attempt to catch the shark using a 20/0 circle hook (zero offset) with a bite-blocker attached. In the case of a very large White Shark, a 27/0 circle hook (zero offset) with a buoy to prevent swallowing of the hook will be used. Once caught, the White Shark will be guided onboard the hydraulic lift on the research vessel, which will then be raised above the waterline. While on the lift, sharks will be provided with oxygenated seawater via a mouthpiece and tube.

Once on the lift, internal acoustic tags will be implanted surgically in the coelomic cavity and the incision will be sutured. Smart Position and Temperature (SPOT) tags will be attached on the leading edge of the first dorsal fin by drilling four holes in the dorsal fin with an electric drill and attaching the tag with nylon bolts, stainless steel locknuts and plastic spacers. The hardware is designed to retain the tag for five years after which it will fail and the tag will detach. ~~All White Sharks caught, up to 20 White Sharks,~~ will have both acoustic and SPOT tags applied. Pop-up Archival Satellite Tags (PSAT) will be attached via a tether to a subdermal metal dart implanted in the shark's flank below the first dorsal fin. PSAT tags will be attached to up to 6 White Sharks caught.

The researchers will also collect samples (blood, muscle, semen, fecal and urine samples), conduct skin, gill and cloacal swabs, collect parasites, collect eye and tail measurements, and perform an ultrasound (females). Samples will be collected using a hypodermic puncture and biopsy punch.

The activities authorized by this permit consist of:

- Actively attracting White Sharks to a vessel;
- Catch and release of White Sharks;
- Lifting individuals out of the water on a hydraulic lift;
- Collecting blood and tissue samples;
- Implanting internal acoustic tags; and
- Attaching SPOT and PSAT tags.

The effects that the activity may cause to the listed wildlife species and the effects of those changes authorized by this permit are as follows:

- Harm, harassment, capture and possession of listed aquatic species at risk.

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## Terms and Conditions of Permit

The activity must be carried on in accordance with the following conditions:

### 1. General Conditions

- 1.1. A copy of this permit shall be kept on site at all times in the possession of the Permit Holder or a person acting under the Permit Holder's authority, and shall be made available to an enforcement officer upon request.
- 1.2. All persons undertaking the activity under the authority of the Permit Holder shall do so under the direction and oversight of the Permit Holder and shall be made familiar with the conditions of this permit.
- 1.3. The activity must comply with the conditions identified within this permit. Activities that affect individuals of species at risk, their residences, or their critical habitat, other than those specifically identified within this permit are not authorized under this permit.
- 1.4. No changes to the Permitted activities shall take place without prior consultation with DFO, and written approval from DFO, Species at Risk Management Division. Contact information as follows:

Species at Risk Management Division  
Fisheries and Oceans Canada  
P.O. Box 1006  
Dartmouth, NS, B2Y 4A2  
email: [SpeciesatRisk\\_xmar@dfo-mpo.gc.ca](mailto:SpeciesatRisk_xmar@dfo-mpo.gc.ca)  
phone: 1-866-891-0771 fax: 1-902-426-2331

### 2. Conditions to avoid or minimize the impact of the activity on the species:

- 2.1. To the extent possible, activities shall be conducted in a manner whereby any individuals of the species shall be handled only in the circumstances authorized under this permit and with the least amount of harm.
- 2.2. Activities shall only be conducted in the study area described above. If activities are to be conducted outside the study area, DFO shall be notified in advance using the contact information in condition 1.4.
- 2.3. Only individuals that are experienced in tagging large pelagic fishes shall tag White Sharks.
- 2.4. White Sharks shall not be chased by the vessel.
- 2.5. The following gear shall be used: circle hooks (either 20/0 or 27/0 with zero offset) rigged with a cross bar bit-blocker (30cm up the leader) and attached to a stainless steel wire rope (3/32" or 1/8"). The leader shall be 10m in length and shall be attached to a braid rope with elasticity properties. Leaders shall be embedded inside a three-strand rope to increase the diameter.
- 2.6. Individual White Sharks shall not be kept on the research platform for longer than 20 minutes.
- 2.7. While on the research platform, oxygenated seawater shall be pumped through a hose and mouthpiece into the shark's buccal cavity at all times.
- 2.8. While on the research platform, a tail rope shall be used to prevent the animal from causing harm to itself and others.
- 2.9. While on the research platform, the animal's head and eyes shall be covered with wet towel to reduce animal stress and keep eyes moist.
- 2.10. While on the research platform, the animal's skin shall be kept wet.
- 2.11. While on the research platform animal stress shall be monitored by observing skin colouration, presence of blood pooling, gill movements, and animal activity. If acute stress is observed, the animal shall be released immediately.
- 2.12. The total time of engagement with a single White Shark from the time it is initially hooked until it is released shall be limited to 40 minutes.
- 2.13. No more than 20 White Sharks, in total, shall be tagged.
- 2.14. No attempts shall be made to tag White Sharks that are injured or behaving abnormally.
- 2.15. Of the 20 White Sharks that may be tagged, SPOT tags may be applied to a maximum of three (3) immature individuals. All other White Sharks to be tagged shall be mature individuals (defined

**Comment [SH1]:** This may be interpreted as a directive to ensure at least 3 of the 20 tagged is immature.



as either Only White Sharks greater than 3.5 metres in total length or by the presence of calcified claspers) shall be tagged.

- 2.16. A DFO representative shall be onboard as an observer during a subset of the expedition to be determined by DFO.
- 2.17. In the event of a mortality or significant injury being sustained by a White Shark during a tagging attempt, all further attempts at tagging shall cease and DFO shall be contacted immediately using the contact information in condition 1.4. No further attempts at catching or tagging White Sharks shall be resumed until approved by DFO.

**3. Conditions that relate to monitoring and reporting:**

- 3.1. By December 31st, 2018, irrespective of whether the Permitted activities took place, a SARA Section 73 Permit Report shall be completed and returned to the Species at Risk Management Division using the contact information provided in condition 1.4. Without limiting the generality of the foregoing, the report shall contain the following information, to the satisfaction of DFO in its sole discretion:
    - 3.1.1. to demonstrate that measures and standards to avoid and mitigate the impacts of the permitted activities on the species were implemented according to the conditions of this permit;
    - 3.1.2. an assessment of whether the measures and standards mentioned in condition 3.1.1 were successful at avoiding and mitigating the impacts of the permitted activities on the species;
    - 3.1.3. details of any contingency measures that were followed to prevent impacts greater than those authorized by this permit;
    - 3.1.4. for any interaction with, or sighting of, a White Shark, report the following: date, time, location, length, size, gender (specify if females are pregnant or not), condition of the individual; and identify if tagging was attempted or undertaken on that individual;
    - 3.1.4.3.1.5 for any sexually mature White Shark less than 3.5 m that is SPOT tagged, provide photographic evidence that is date and location stamped showing clasper calcification; and
    - 3.1.5.3.1.6. .... provide details of any tagging attempts, including whether tagging was successful, unplanned or unexpected impacts on the shark, reaction of the shark to the tagging, and lessons learned.
-

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**Authorization Limitations and Application Conditions**

This permit cannot be transferred or assigned to another party. If the activity authorized under this permit is sold or transferred to another party, or if other circumstances arise that result in another party taking over the activity, the Permit Holder shall advise DFO in advance if the ownership or responsibility for the activity is expected to change.

The failure to comply with any condition of this permit is an offence under section 97 of SARA and might result in charges being laid under SARA.

This permit may be revoked or amended to ensure the survival or recovery of White Shark. Without limiting the generality of the foregoing, DFO may:

- suspend any permitted activities to avoid or mitigate additional adverse direct or indirect effects to White Sharks;
- amend or revoke this permit; and
- direct the Permit Holder to carry out at the Permit Holder's expense any modifications or actions deemed necessary by DFO to avoid or mitigate existing impacts or to avoid further adverse direct and indirect impacts to White Sharks.

This permit is valid only with activities and species listed herein and for no other purposes. It does not authorize the Permit Holder to kill, buy, sell, or trade an individual of a wildlife species that is listed as extirpated, endangered or threatened, or any part or derivative of such an individual. This permit does not purport to release the Permit Holder from any obligation to obtain permission from or to comply with the requirements of any other regulatory agencies.

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SARA Permit No. : DFO-MAR-2017-17b

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Date of Issue: April 30, 2018

Date of Amendment:

Signature of authorizing officer: \_\_\_\_\_

Donald Humphrey  
Manager, Species at Risk Management Division  
Maritimes Region  
Fisheries and Oceans Canada  
1 Challenger Drive, P.O. Box 1006, Dartmouth, NS, B2Y 4A2

Further information about this permit is available from the above authorizing officer ([Donald.Humphrey@dfo-mpo.gc.ca](mailto:Donald.Humphrey@dfo-mpo.gc.ca)).

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## **MacDonald, Jennifer**

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**From:** MacDonald, Jennifer  
**Sent:** October-02-18 12:10 PM  
**To:** Humphrey, Donald  
**Subject:** FW: OCEARCH permit amendment

**Follow Up Flag:** Follow up  
**Flag Status:** Flagged

Hi Donald,

Thanks for the signed permit back. Before I send it, the updated assessment and approval form is here: [R:\Oceans & Habitat\Species at Risk\Permitting\1-Permits\2017\17-WS-Fischer-Ocearch\3 REVIEW\2 Amendment](#) (it's the one marked v2). I wanted to pass along Heidi's comment below and the approval form before I send the amended permit off to OCEARCH. Please let me know if you would like any changes made to either the approval form or permit, then I will print the approval form out for your signature.

Thanks  
Jenn

**Jennifer MacDonald**  
Species at Risk Management Division  
(902) 407-8175

---

**From:** Schaefer, Heidi  
**Sent:** October-02-18 10:57 AM  
**To:** MacDonald, Jennifer  
**Subject:** RE: OCEARCH permit amendment

Looks fine to me. If we want to be more precautionous and reduce the number of immature to 1 or 2, that would also be reasonable to me – but is up to Donald to decide.

Heidi

**From:** MacDonald, Jennifer  
**Sent:** Tuesday, October 2, 2018 10:03 AM  
**To:** Schaefer, Heidi <[Heidi.Schaefer@dfo-mpo.gc.ca](mailto:Heidi.Schaefer@dfo-mpo.gc.ca)>  
**Subject:** RE: OCEARCH permit amendment

Thanks Heidi. I have reworked the assessment form, if you want to have a look at that text before we give it to Donald for signature.

Jenn

**Jennifer MacDonald**  
Species at Risk Management Division  
(902) 407-8175

---

**From:** Schaefer, Heidi  
**Sent:** October-02-18 8:57 AM

**To:** MacDonald, Jennifer  
**Subject:** RE: OCEARCH permit amendment

Hi Jenn, I reviewed both permit and review form and made just a couple of comments/edits using track changes.

Heidi

**From:** MacDonald, Jennifer  
**Sent:** Monday, October 1, 2018 3:46 PM  
**To:** Schaefer, Heidi <[Heidi.Schaefer@dfo-mpo.gc.ca](mailto:Heidi.Schaefer@dfo-mpo.gc.ca)>  
**Subject:** RE: OCEARCH permit amendment

Hi Heidi,

I have also updated the approval and assessment form, saved here: [R:\Oceans & Habitat\Species at Risk\Permitting\1-Permits\2017\17-WS-Fischer-Ocearch\3 REVIEW\2 Amendment.](#)

All the text highlighted in yellow is new text added to the original form.

Thanks,

Jenn

**Jennifer MacDonald**  
Species at Risk Management Division  
(902) 407-8175

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**From:** MacDonald, Jennifer  
**Sent:** October-01-18 3:18 PM  
**To:** Schaefer, Heidi  
**Subject:** OCEARCH permit amendment

Hi Heidi,

I spoke with Donald following the email from Bob Heuter (attached) and a follow-up phone call with him; OCEARCH is requesting an amendment to tag both mature and immature individuals. Based on Donald's input on the direction to go, I drafted an amendment to the permit to adjust the condition to allow for tagging of both (mature individuals and a limited number of immature individuals). The permit is [here](#). All the changes are shown in track changes.

I'm working on updating the Assessment and Approval form to record the decision; Donald indicated he was fine with receiving the amended permit language and then following up with the amended review form. Once you have reviewed the amended permit, I can print a clean version for Donald's signature.

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Jenn

**Jennifer MacDonald**  
Species at Risk Biologist | Biologiste des espèces en péril  
Species at Risk Management Division | Division de la gestion des espèces en péril  
Ecosystem Management | Gestion des écosystèmes  
Fisheries & Oceans Canada | Pêches & Océans Canada  
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Tel | Tél: (902) 407-8175 Fax | Téléc: (902) 426-2331  
Email | Courriel: [jennifer.macdonald@dfo-mpo.gc.ca](mailto:jennifer.macdonald@dfo-mpo.gc.ca)



FILE NO: DFO-MAR-2017-17  
17-PNFL-00020

**Ecosystem Management – Assessment and Approval of  
Species at Risk Act (SARA) Section 73 Permit Application**

**1. APPLICANT INFORMATION**

Permit Renewal? ☐ Yes ☒ No  
Permit Amendment? ☒ Yes ☐ No  
Is this a multi-year permit application? ☐ Yes ☒ No  
If so, what is the starting year and ending year:  
Previous Permit Number(s): n/a

Text in yellow below represents the information amended since the original permit was issued.

**Individual(s) or Organization to appear as the Licensee on the Permit**

Name: OCEARCH  
Contact: George Christopher Fischer  
Email: [chris@oearch.org](mailto:chris@oearch.org)  
Address: 1790 Bonanza Drive, Suite 101B  
Park City, Utah, USA 84060  
Phone: 435-645-8990

The following individuals and those under their direct supervision may undertake the activities authorized by the permit:

Name	Organization
Robert Hueter	Mote Marine Laboratory

**2. ACTIVITIES INFORMATION**

a) **Listed Species Affected:** White Shark (*Carcharodon carcharias*), Atlantic population - Endangered

**b) Project Summary:**

OCEARCH is proposing to conduct scientific research on White Sharks in Canadian waters to provide information in relation to a number of questions, including understanding the role of coastal waters off Nova Scotia and Newfoundland in the life history of the White Shark population, the range of the White Shark population in the northwest Atlantic, the health of White Sharks inhabiting Canadian waters, and adaptations of White Sharks for northwest Atlantic waters.

OCEARCH is proposing to conduct a research expedition in Canadian waters in September/October 2018, involving a collaborative team of scientists who will be onboard and collecting data to support a number of research projects. Sharks will be caught and guided to a research platform on the M/V OCEARCH. Research procedures (sampling and tagging) will be carried out on board the vessel, following which the animals will be released live. OCEARCH has requested a permit to tag 20 sharks in Canadian waters based on their analysis that 60 sharks are required for their various research studies (20 young-of-the-year, 20 immature and 20 mature); to date OCEARCH has tagged 33 sharks in the north Atlantic

**Actively attracting White Sharks to the fishing boat and the larger research vessel** will be carried out by placing chum in the water using a variety of techniques. Observers on board the vessel scan for

signs of White Shark activity and OCEARCH also makes use of drones, to search for White Sharks. To attract sharks, a combination of chum bags, chum boxes, bait tanks, chum tubes and decoys are used. The chum consists of whale blubber and oil, mackerel and tuna, and/or menhaden oil. OCEARCH will seek a marine mammal permit from DFO to authorize the use of marine mammal material in Canadian waters.

**White Sharks will be caught** from the fishing boat using a circle hook (20/0 or 27/0 with zero offset). The hooks will be rigged with a crossbar bite-blocker (30cm up the leader) to prevent the shark from swallowing the bait. The hook will be attached to stainless steel wire rope (3/32" or 1/8"); the leader is about 10m and will be attached to a braid rope with elasticity properties to reduce hard shock when the initial struggle ensues. Typically within 5-10 minutes of being caught, the White Shark is guided onto the hydraulic lift on the research vessel.

**White Sharks will be lifted out of the water** on a hydraulic lift that is lowered off the research vessel. The lift, which includes side guides and an end gate to prevent the shark from swimming off, will be lowered below the waterline and the shark guided on. The lift will then be slowly raised above the water. Once on the lift, the hook will be removed from the shark's jaw. Oxygenated seawater will be pumped through a hose and mouthpiece (allowing for simultaneous flushing of the gills on both sides of the head) into the shark's buccal cavity at all times while on the lift. The shark will be on its side for the initial 5-7 minutes (to take blood samples, implant the acoustic tag, perform ultrasound) then it is rolled to an upright position (to attach satellite tag). Other procedures undertaken while the White Shark is on the lift will be the collection of swabs (skin mucus, gill surface and cloacal swabs); collection of parasites, collection of semen, fecal, and muscle samples, as well as possibly urine samples if the animal urinates while on deck, and the collection of eye and tail measurements.

**Blood and tissue sampling** will be conducted while White Shark are onboard the vessel. A hypodermic puncture and biopsy punch will be used to obtain blood (<25ml), muscle (<5g), semen, and skin mucus samples.

**Implantation of internal acoustic tags** will be conducted by making a surgical incision to insert a sterilized transmitter (1cm x 6cm) into the coelomic cavity. The incision will be sutured and the sutures will be absorbed over a period of time. OCEARCH is proposing to insert the internal acoustic tags in every White Shark (up to 20) caught in Canadian waters under this permit application.

**Attachment of satellite tags** will be conducted by drilling and bolting Smart Position or Temperature (SPOT) tags on the leading edge of the first dorsal fin. The SPOT tags (Wildlife Computers Model SPOT-257) measure 162 x 57 x 20 mm and weigh 160 g. To attach the tag, four holes are drilled in the dorsal fin with an electric drill (drill bit will be cleaned and sterilized in alcohol before use). The tag will be attached with alcohol-sterilized nylon bolts, stainless locknuts and plastic spacers (standard hardware from the tag manufacturer). Tags will be coated with an antifouling compound. The hardware is designed to retain the tag for five years, after which it will fail and the tag will detach. OCEARCH is proposing to attach a SPOT tag to every White Shark (up to 20) caught in Canadian waters under this permit application.

**Pop-up Satellite Archival Tags (PSAT)** will be attached via a tether to a subdermal metal dart implanted in the shark's flank below the first dorsal fin. PSAT tags are provided to OCEARCH by a collaborator at the Woods Hole Oceanographic Institution. The number of tags has not been confirmed, but will likely be 4-6 tags. The PSAT tags will be attached, in addition to acoustic and SPOT tags, on 4-6 White Sharks.

OCEARCH is also potentially looking to use a prototype tag that is a combination of a PSAT and SPOT tag. The tag is attached via a darted tether in the same way as a PSAT tag. If these new prototype tags are available, they will be used instead of the PSAT tag on 4-6 White Sharks. As these are prototype tags, OCEARCH is proposing to use these tags in combination with the SPOT tags to validate the new tag's geolocation data.

c) Analysis of Proposed Activities:

<b>Location:</b> Atlantic Ocean				
Coastal Nova Scotia: <ul style="list-style-type: none"> <li>• Mahone Bay (44° 29.50' N / 64° 13.50' W and adjacent areas</li> <li>• Bay of Fundy (44° 54.00' N / 66° 32.50' W and adjacent areas</li> </ul> South Coast of Newfoundland. <ul style="list-style-type: none"> <li>• Placentia Bay (47° 05.00' N / 54° 32.00' W</li> </ul> Sable Island (43° 56.14' N / 59° 56.59' W)				
<b>Dates:</b> September 18-October 11, 2018				
Proposed Activity	Planned Effects/Outcome		Potential Incidental Effects/Outcome	
	Prohibitions that Apply	Likelihood of the prohibited impact(s)	Prohibitions that Apply	Likelihood of the prohibited impact(s)
Actively attracting White Sharks to a vessel (i.e., chumming)	Harass	Med	Harm Kill	Low Low
Capture of White Sharks	Harass Harm Capture	High Low High	Kill	Low
Lifting White Sharks out of the water	Harass Harm Capture	High Low High	Kill	Low
Blood and tissue sampling	Harass Harm Possess	Med Low High	Harm	Low
Implantation of internal acoustic tags	Harass Harm	Med Low	Kill	Low
Attachment of satellite tags – SPOT tags	Harass Harm	Med Low	Kill	Low
Attachment of satellite tags – PSAT tags	Harass Harm	Med Low	Kill	Low

Impacts to individual White Sharks would result from any distress associated with the approaching vessel, being caught and brought onboard the vessel and out of the water, the application of the different tag types and the collection of biological samples.

**Actively attracting White Sharks to a vessel (i.e., chumming)**

A number of studies suggest that the presence of chum may be linked to modification of White Sharks' normal swimming and/or hunting behaviours, although the effects are likely short term when chum is used for short term research projects.<sup>1</sup> It is possible that attracting a White Shark will cause the individual to stray from patrolling for food or from mating. Disturbance to normal feeding behaviours may result in energetic costs.<sup>2</sup>

There is a possibility that attracting sharks to the fishing boat or the research vessel may result in collisions between the shark and the vessel and that the presence of the vessel may cause behavioural changes.

<sup>1</sup> NOAA. 2014. Draft Programmatic Environmental Assessment of Potential White Shark Research and Education Projects within the Gulf of the Farallones and Monterey Bay National Marine Sanctuaries. [https://nmssanctuaries.blob.core.windows.net/sanctuaries-prod/media/archive/library/pdfs/gfms\\_draft\\_white\\_shark.pdf](https://nmssanctuaries.blob.core.windows.net/sanctuaries-prod/media/archive/library/pdfs/gfms_draft_white_shark.pdf)

<sup>2</sup> Semmens, J.M., Payne, N.L., Huveneers, C., Sims, D.W. & Bruce, B.D. 2013. Feeding requirements of White Sharks may be higher than originally thought. Sci. Rep. 3, 1471; DOI:10.1038/srep01471 (2013).



### **Catch of White Sharks**

Catch and release fishing is a source of stress to White Sharks due to the potential for long fight times (exhausting the individuals) and injury from wounds caused by the hooks. Long capture times have been known to kill bony fish and other sharks.<sup>3</sup> Physiological disruptions to fish result from the high anaerobic activity, muscle fatigue and time spent out of water caused by capture using most fishing techniques.<sup>4</sup>

Injury can result from the wound caused by the hook, although the extent of the tissue damage or injury will depend on the location of the hook and the type of gear. Sub-lethal injury can result from removing hooks or leaving them in place in the throat, esophagus or gut. In the short term, a hook in the mouth will cause a loss of blood, but the wound would be expected to heal within a year or less. Circle hooks are known to cause lower incidences of internal injury than conventional J hooks.<sup>5</sup>

Although not specific to White Shark, a study in Australia examined post release survival in Shortfin Mako by attracting individuals to a boat using chum, then using monofilament line and either J hooks or circle hooks to catch the sharks. The study showed that the length of the fight time did not impact survival. Circle hooks significantly reduced foul hooking. The study showed that hook choice affected the likelihood of mortality, while the species' is able to cope with long fight times and associated physiological responses to capture due to its endothermy and high aerobic scope.<sup>6</sup>

It has been suggested that sharks, in general, are capable of recovery from physiological stress associated with capture and that any mortality is more likely linked to the extent of any physical injuries.<sup>7</sup>

### **Lifting White Sharks out of the water**

The research platform is raised and the White Sharks are lifted from their natural, in-water environment. This removal from the water likely results in physiological stress and possible oxygen deprivation.

Lifting White Sharks out of the water, onto a hard raised platform, may create excessive pressure on tissues and organs that usually do not bear weight. This impact may be greater in larger individuals.

While there are concerns about damage to internal organs, there is no evidence reported of internal organs being crushed when sharks are removed from the water.<sup>8</sup> However, if sharks are thrashing on the deck, this could lead to internal injuries.

OCEARCH has taken blood samples in the first minute and the last minute on the lift for 120 White Sharks handled in this manner and found stress levels remain relatively low throughout the handling time. Higher amounts of stress due to capture were shown in very young White Sharks (however OCEARCH is not proposing to catch young sharks in Canadian waters).

### **Blood and tissue sampling**

The *Canadian Council on Animal Care Guidelines on Care and Use of Fish in Research* suggest that blood samples be up to 1ml/kg body size. The volume proposed to be collected by this project is well under this recommended amount.

The retention of the blood and tissue samples involves possession of parts of individuals.

### **Implantation of internal acoustic tags**

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<sup>3</sup> NOAA 2014

<sup>4</sup> Skomal, G.B. 2007. Evaluating the physiological and physical consequences of capture on post-release survivorship in large pelagic fishes. *Fisheries Management and Ecology*. 14: 81-89.

<sup>5</sup> NOAA 2014

<sup>6</sup> French R.P., Lyle J., Tracey S., Currie S., Semmens J.M. 2015. High survivorship after catch-and-release fishing suggests physiological resilience in the endothermic shortfin mako shark (*Isurus oxyrinchus*). *Conserv Physiol* 3: doi:10.1093/conphys/cov044.

<sup>7</sup> Skomal 2007

<sup>8</sup> NOAA 2014

Implanting internal acoustic tags requires making a surgical incision, from which there could be a risk of infection or causing harm to the individual.

#### **Attachment of satellite tags (SPOT and PSAT)**

In terms of physical injury associated with the tagging, shark species in general are very resilient to superficial cuts and have a tremendous capacity to heal from injury.<sup>9</sup> Similar and much more extensive lacerations occur frequently during mating behaviours, and one of the identifying characteristics of a mature female shark is deep scarring along her dorsal musculature. The tagging site is expected to close over very quickly with minimal effect on the animal, as has been observed in other species held in captivity after tagging.

Various studies have examined possible longer term effects of electronic tags or data loggers on the swimming efficiency of sharks, but results have been variable.<sup>10</sup> There may be a marginally increased drag while swimming due to the external tag.

A study from South Africa suggests that SPOT tags can cause permanent cosmetic and structural damage to the dorsal fins of White Sharks, depending on how long the tag is attached for. Tags that detach within 12-24 months did not seem to cause long term damage; while after 24 months permanent damage to the dorsal fin was reported. However, the study did not show that the damage to the dorsal fin resulted in impacts to long term survival or body growth.<sup>11</sup>

Research from Monterey Bay Aquarium also showed that real-time satellite tags attached with multiple bolts on juvenile White Sharks affects the growth of the dorsal fin (growing around the tag or causing a deflection to the tip of the fin). They suggested that there may be more of a reaction to the presence of the bolts and tag in growing tissue.<sup>12</sup>

OCEARCH has provided photographs of White Sharks observed years after tagging that show that the fins have healed and are functioning properly.

#### **Post Release Behaviour and Longer Term Effects**

Results from research in which White Sharks were caught and restrained using an in-water stretcher and then tagged, has shown a six to 48-hour recovery period for individuals after capture and tagging.<sup>13</sup>

Post-release behavioural studies by OCEARCH collaborating scientists using accelerometers attached to the sharks have shown recovery and resumption of natural swimming behaviour within approximately 6 hours after release.

Research conducted off the west coast of California that involved tagging 21 White Sharks (2007-2012), found that they resumed 'normal' behaviours after tagging, as determined by their migration patterns. These sharks were tagged with SPOT tags (using various methodology including being lifted onto a platform out of the water and being tagged while alongside the research boat).<sup>14</sup>

It has been suggested that catch and release of marine pelagic fish may have sublethal population level effects due to reduced individual fitness. However, as these population level effects are difficult to assess in highly migratory species with poorly understood life histories, this has not been quantified or studied in depth.<sup>15</sup>

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<sup>9</sup> NOAA 2014

<sup>10</sup> Hammerschlag, N., 2011. A review of shark satellite tagging studies. *J. Exp. Mar. Biol. Ecol.* doi:10.1016/j.jembe.2010.12.012

<sup>11</sup> Jewell O.J.D., Wcisel M.A., Gennari E., Towner A.V., Bester M.N. 2011. Effects of Smart Position Only (SPOT) Tag Deployment on White Sharks *Carcharodon carcharias* in South Africa. *PLoS ONE* 6(11): e27242. doi:10.1371/journal.pone.0027242

<sup>12</sup> NOAA 2014

<sup>13</sup> NOAA 2014

<sup>14</sup> NOAA 2014

<sup>15</sup> Skomal 2007

As little is known about White Shark mating behaviour, it is unknown whether tagging could have an impact on mating.<sup>16</sup>

There is anecdotal evidence of at least one White Shark having died following interactions with OCEARCH using the methods proposed here.

### Summary

Based on the above assessment, the following activities have the potential to contravene the SARA prohibitions and therefore must be authorized under SARA:

- Actively attracting White Sharks to a vessel;
- Catch and release of White Sharks and lifting individuals out of the water on a hydraulic lift;
- Collecting biological samples from White Sharks;
- Implanting internal acoustic tags; and
- Attaching SPOT and PSAT tags to White Sharks.

The effects that these activities may cause to White Sharks include:

- Capture and harassment of, and potentially harm to, individuals,
- Possession of samples from individuals, and
- Although unlikely, killing of, individuals.

The Species at Risk Management Division has concluded that the activities associated with the above project are likely to affect the **White Shark, Atlantic population**, in a manner that is prohibited by SARA, and therefore a SARA Section 73 permit is considered necessary to engage in the proposed activities.

## 3. REGULATORY ASSESSMENT OF APPLICATION

### Necessity Assessment

Work through the following five questions to determine the appropriate action for DFO to take in response to the permit application.

1. Is it likely that one or more species listed on Schedule 1 of the SARA occurs at any of the locations identified for the proposed activities?

- ☒ Yes ..... **Go to next question**  
☐ No .....

**A SARA permit is not necessary. The applicant will be informed in writing and advised to ensure any other required authorizations are obtained before proceeding with the activities. Go to Assessment Summary.**

2. Are any of the SARA-listed species concerned considered an "Aquatic Species" as per the definition in the *Fisheries Act*?

- ☒ Yes ..... **Go to next question**  
☐ No .....

**The applicant will be directed to resubmit the application to the appropriate agency. Go to Assessment Summary.**

3. Are the locations at which any of the activities are proposed to take place under the jurisdiction of Fisheries and Oceans Canada?

- ☒ Yes ..... **Go to next question**  
☐ No .....

**The applicant will be directed to resubmit application to the appropriate agency. Go to Assessment Summary.**

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<sup>16</sup> NOAA 2014

4. Is it certain or likely that performing any of the proposed activities will affect the SARA-listed species concerned in a way to contravene the general prohibitions of SARA (subsections 32(1), 32(2), section 33, subsections 36(1), 58(1), 60(1) and 61(1))?

- ☒ Yes ..... **Go to next question**  
☐ No .....

**A SARA permit is not necessary. The applicant will be advised of this in writing. Go to Assessment Summary.**

5. Do any of the exceptions listed in SARA Section 83 apply to the proposed activities concerned?

- ☐ Yes .....  
**A SARA permit is not necessary. The applicant will be advised of this in writing and the basis on which an exception applies will be described here. Go to Assessment Summary.**  
☒ No .....

**A SARA Section 73 permit is required to avoid contravention of the prohibitions of SARA. DFO will proceed with the application to assess eligibility. Go to Eligibility Assessment.**

#### **Eligibility Assessment**

The following two questions assess whether the proposed activities are eligible for a SARA Section 73 permit.

**1. Section 73(2):** The purpose of the proposed activities is described by **one or more** of the following:

- ☒ The activity is scientific research relating to the conservation of SARA-listed species and will be conducted by qualified persons
- ☐ The activity benefits the species or is required to enhance its chance of survival in the wild.
- ☐ Affecting the SARA-listed species is incidental to carrying out the activity

The proposed activities aim to answer a number of research questions, both through the tracking of individual White Sharks that will be tagged and through analysis on blood and other tissue samples.

The draft Recovery Strategy for White Shark identifies the following as high priority research and management approaches:

- undertake scientific research to better understand population dynamics, distribution and habitat use.
- collect and maintain White Shark sightings information; maintain this information in a database and share via network

OCEARCH's Chief Science Advisor is Dr. Robert Hueter. He is the Director of the Center for Shark Research at the Mote Marine Laboratory and has more than 25 years experience in shark research.

- ☒ Yes ..... **Go to next question**  
☐ No .....

**The proposed activities are not eligible for a SARA Section 73 Permit. Go to Assessment Summary.**

**2. Section 73(3):** The proposed activities meet **all** of the following pre-conditions:

- ☒ All reasonable alternatives to the activity that would reduce the impact on the species have been considered and the best solution has been adopted

In the consideration of alternatives to the proposed research, there are a number of alternatives that should be considered. The first alternative to consider would be to not undertake the activity and not conduct the research; however, given the many unknowns about the species this would not represent

the best solution as it would be a loss of an opportunity to learn more.

There are no alternative locations to conduct the research, as it must be conducted within the range of the species.

In relation to the proposed activities, overall the applicant asserts that the methods and procedures proposed are the safest and most successful way of obtaining the necessary samples and attaching SPOT tags.

#### **Attracting and Catching White Shark**

- The alternative to chumming for White Shark is to not use chum, which would limit the ability to sight White Sharks to passive observations. Given the low numbers in a large area, chance encounters would be low, which would reduce or even eliminate the success rate of researchers attempting to deploy tags or obtain samples.

#### **Catching, restraining and lifting the shark out of the water**

- Alternative approaches include (1) attracting a shark and sampling/tagging it without restraining or catching it and (2) attracting a shark and catching it, but conducting sampling/attaching tags while the shark remains in the water.
- The following summarizes the type of tagging and sampling that is possible under each alternative:

	(1) No Capture	(2) Capture and Tag in Water	(3) Capture and Use of Lift
Tag Types	PSAT Acoustic (external)	SPOT PSAT Acoustic (external)	SPOT PSAT Acoustic (internal or external)
Other Samples	– muscle samples	– blood samples – swabs (skin mucus) – muscle samples	– blood samples – swabs (skin mucus, gill surface and cloacal swabs) – muscle samples – parasite samples – semen samples – fecal samples – urine samples (opportunistic) – eye/tail measurements – ultrasound

- Under alternative (1), the success rate for tagging and collecting samples would likely be less than using one of the alternative methodologies, which involve catching the sharks. This approach can also require chasing the individuals with a small to mid-sized boat, which can increase stress levels. There is a risk with this approach that tags would not be attached properly.
- Under alternative (2), some researchers have suggested that keeping the shark in the water reduces the stress experienced by the shark as a result of being lifted from the water. However, OCEARCH has indicated that sharks are more likely to struggle if they remain in the water, while being on the lift quiets the animals and therefore they conclude that the proposed method reduces the potential for harm to the sharks. Sampling and tagging using an alongside-boat method requires calm sea conditions, which are often not encountered. Working alongside a boat with a large animal that is likely to be struggling also increases the risk to researchers.
- With respect to the precise methodology proposed to capture sharks, the approaches proposed likely present the best alternative to reduce potential impacts. Alternatives would be to use a 'J' hook instead of a circle hook, to not use the bite blocker, to not embed the leaders in rope. However, all of these alternatives would increase the risk of internal (e.g., gut-hooking) or external (e.g., lacerations) injury to the sharks.

#### **Blood and tissue sampling**

- An alternative method to collecting biological samples, would be collect samples by harpoon, while the shark remains in the water. However, the collection of blood samples, swabs of the skin mucus, gill surface and cloacal, parasite collection and semen samples require catching and controlling the animal. Further, attempting to obtain samples in the water increases the risk of sample contamination, loss of sample and infections in the shark. Muscle samples are taken from the site of the PSAT tag attachment reducing sample wounds on the shark.

#### Tagging

- SPOT, PSAT and acoustic tags all collect different types of data:
  - SPOT tags transmit location and other data in real time. Information is transmitted while the tag is attached to the shark; the data signal from these tags is sent when the shark's dorsal fin is at the surface. SPOT tags may transmit data for up to 3-5 years. To obtain real-time geolocation data from an animal that is wide ranging within areas that are previously unknown, SPOT tags provide the best option for collecting this data.
  - Data from PSAT tags is stored on the device and retrieved after the tag detaches from the shark. PSAT tags will collect data for approximately one year. PSAT tags provide archived temperature and depth data, but the geolocation data is less precise and not available in real-time.
  - Acoustic tags are useful to detect the arrival of an animal in an area where underwater acoustic receivers have been deployed (typically well-studied inshore areas). These tags provide fine-scale geolocation data, but only in areas where there are acoustic receivers.
- OCEARCH has indicated that to understand an animal's large scale movements and migration, SPOT tags are the most effective in revealing the precise tracks and this data, in their perspective, cannot be substituted with data from PSAT or acoustic tags. Further, the real time data from SPOT tags support their educational and outreach objectives.
- There are alternative attachment methodologies for tags:
  - Acoustic tags can be attached externally rather than internally. While some researchers have successfully utilized externally attached acoustic tags, OCEARCH has indicated that there are concerns with the risk that external tags can be shed. In addition, internal tags have been shown to transmit for up to 5 years (and even up to 10 years), while external tags have a shorter lifespan of approximately 1 year. OCEARCH has further indicated that the internal tags do not cause on-going harm to sharks once implanted.
  - SPOT tags can also be attached as floating tags, however OCEARCH indicated concern that floating SPOT tags can be fouled, shed and lost from the animal very rapidly.
  - Other researchers have developed a technique to attach SPOT tags with a single bolt, rather than the four bolt attachment methodology proposed by OCEARCH. OCEARCH has indicated that their information indicates that the single bolt attachment has a shorter lifespan, limiting the data that can be collected. Additionally, the single bolt attachment requires a saddle in which the tag is placed when attached; this saddle may decrease hydrodynamics for the sharks on an on-going basis.

- ☒ All feasible measures will be taken to minimize the impact of the activity on the species or its critical habitat or the residence of its individuals

The following measures were proposed by OCEARCH to minimize the impacts of the activities:

- individuals will not be chased by the vessel, but will be attracted using chum;
- gear will be used that will minimize the chance that animals are gut-hooked (including using circle hooks and a crossbar bite-blocker);
- animal struggles and injury will be minimized by:
  - using a leader attached to a braid rope with elasticity properties to help reduce hard shock during the initial struggle;
  - using a 10m leader length in case the shark rolls in the line to ensure that the shark cannot bite through the rope and escape (retaining the hook and leader);
  - embedding the leader inside a three-strand rope to give it a thicker diameter so that if the shark rolls, the thicker rope does not cut into the sharks' skin and is easier to unwrap;

- using heavier tackle that keeps enough pressure on the shark so that the line is stretched tight and the shark cannot turn and roll.
- all research procedures will be conducted within 20 minutes;
- while on the research platform:
  - oxygenated seawater will be pumped through a hose and mouthpiece (allowing for simultaneous flushing of the gills on both sides of the head) into the shark's buccal cavity at all times;
  - a tail rope will be used to prevent the animal from causing harm to itself and others;
  - the head and eyes will be covered with wet terrycloth towel to reduce stress and keep eyes moist;
  - skin will be kept wet during in-air procedures to prevent drying;
  - animal stress will be monitored by observing skin colouration, presence of blood pooling, gill movements, and animal activity:
    - if stress is detected in the animal, a blood sample will be taken to evaluate the shark's conditions;
    - if acute stress is observed, the animal will be released immediately.
- OCEARCH is currently seeking approval of their animal care plan from Jacksonville University and will notify DFO once that the approved plan is in place.

In addition, the permit will require that:

- the total time of engagement with a single White Shark be limited to 40 minutes (from the time it is initially hooked until it is released);
- a maximum number of 20 White Sharks can be tagged;
- as the impact on fin development of attaching SPOT tags has been shown to be greater in juvenile sharks<sup>17</sup>, the original permit limited tagging to individuals greater than 3.5 m total length, based on published data on size at maturity for males. The condition was re-evaluated upon a request from OCEARCH to consider SPOT tagging of both immature and mature individuals, as well as to reconsider how maturity in White Sharks is determined.
- While length (based on published data on size at maturity) is considered by some scientists to be the best tool to determine maturity in the field; in males, evidence of calcification of the claspers is also a good indication of maturity. Therefore, the permit condition is amended to indicate that mature white sharks may be tagged and that maturity is defined as being either greater than 3.5 m total length or the presence of calcified claspers.
- The permit is further amended to allow up to 3 immature White Sharks to be tagged with SPOT tags (individuals that are less than 3.5 m total length and do not have calcified claspers):
  - Although tagging juvenile sharks may lead to permanent impacts on fin development, there does not seem to be an impact on survival<sup>18</sup>.
  - While survival does not seem to be impacted, it is unknown if there are long-term impacts on fitness. In an extreme example, if the application of a SPOT tag on a smaller individual did lead to a reduction in fitness that was severe enough as to affect reproduction; this could be thought of as equating to a loss of that individual from the reproducing population (similar to a mortality).
  - The 2017 allowable harm assessment concluded that there is scope for mortality in Canadian waters without jeopardizing survival or recovery of the species. Recovery goals can likely be achieved if mortality levels remain at current levels (3 animals per decade) or increase slightly. The proportion of simulated population trajectories that declined over three generations was approximately 21% if mortality is 3 White Sharks per year.
  - Therefore, although impacts on fitness are unknown, if tagging smaller individuals did have an impact on fitness (which is not thought to be likely as extreme as causing mortality or severe impacts), by limiting the application of SPOT tags to 3 immature individuals, this would be unlikely to jeopardize survival and recovery, as any potential impacts would still fall within the allowable harm for the species.

<sup>17</sup> Jewell et al. 2011

<sup>18</sup> Jewell et al. 2011

- A similar approach is proposed for the exempting activities in the draft Recovery Strategy, where it is proposed that a maximum bycatch mortality rate of one White Shark per year averaged over any 10 year period (i.e., maximum of 10 mortalities over 10 years), is deemed acceptable. The draft Exemption Management Plan proposes that the exemption be reviewed if there are 3 mortalities/year for 2 consecutive years.
- a DFO Scientist or Observer or other representative must be onboard during a subset of the expedition, as determined by DFO;
- work will cease and DFO will be contacted immediately if there is any mortality of a White Shark or if a White Shark receives any significant injury and no further attempts at catching or tagging White Sharks will be resumed until approved by DFO;
- all interactions with White Sharks (including location of capture/tagging events; number and gender/age of all White Sharks caught and tagged) and all mitigation measures employed will be reported to DFO. In addition, unsuccessful tagging attempts, in which White Sharks were observed but not caught or tagged, will also be reported to DFO (location, length estimate, gender (if visible), weight).

☒ The activity will not jeopardize the survival or recovery of the species

Tagging of White Sharks is unlikely to jeopardize the survival or recovery of the population. The recovery goal in the draft recovery strategy is to: "Maintain or increase the population of White Sharks that frequent Atlantic Canadian waters." No mortality is expected as a result of the activities, and therefore recovery will not be compromised. Even in the very unlikely event that mortality occurs during the activities, Science advice indicates that the population of White Sharks in the NW Atlantic is increasing and current mortality levels (due to incidental capture in fisheries) would have to increase substantially before population trajectories would be predicted to decline. Therefore there is a high likelihood that recovery goals can be achieved under various scenarios of allowable harm for White Shark, even if annual bycatch mortality increases from historical estimates.<sup>19</sup>

☒ Yes ..... **Go to Consultation Assessment**  
☐ No .....

**The proposed activities are not eligible for a SARA Section 73 Permit. Go to Assessment Summary.**

### **Consultation Assessment**

The following two questions assess whether consultation with an outside party is required before issuing a SARA Section 73 Permit for the proposed activities:

1. **Section 73(4):** Do the proposed activities concern a species in an area in respect of which a wildlife management board is authorized by a land claims agreement to perform functions in respect of wildlife species?

☐ Yes ..... **Go to Assessment Summary**  
☒ No ..... **Go to next question**

2. **Section 74(5):** Do the proposed activities concern a species in a reserve or any other lands that are set apart for the use and benefit of a band under the Indian Act?

☐ Yes ..... **Go to Assessment Summary**  
☒ No ..... **Go to Assessment Summary**

### **Assessment Summary**

The above assessment is summarized below. In order to recommend that a SARA Section 73 Permit be issued for the proposed activities, the above assessment must demonstrate that doing so is warranted, lawful, and if applicable, that all consultation requirements of SARA s. 73(4) or 73(5) have been fulfilled.

<sup>19</sup> DFO. 2017. Evaluation of Scope for Harm for White Shark (*Carcharodon carcharias*) in Atlantic Canada. DFO Can. Sci. Advis. Sec. Sci. Resp. 2017/025.



1. The proposed activities warrant the need for a SARA Section 73 Permit.

☒ Yes ..... Go to next question

☐ No .....

**A SARA permit is not necessary. The applicant will be advised of this in writing. Go to EM Permit Decision.**

2. The proposed activities are consistent with all of the eligibility requirements of SARA Section 73.

☒ Yes ..... Go to next question

☐ No .....

**The proposed activities are not eligible for a SARA s.73 Permit. Go to EM Permit Decision.**

3. The permit decision, proposed activities, and any permit contents require consultation with an outside party.

☐ Yes .....

**Undergo consultation with the appropriate party before proceeding further in the permitting process.**

☒ No .....

**Issue a SARA s.73 Permit. Go to Ecosystem Management Permit Decision.**

#### 4. REVIEW

Input sought from:

Name	DFO Sector
Aimee Gromack	DFO Maritimes - SARMD
Heather Bowlby / Warren Joyce	DFO Maritimes - Science
Darrin Sooley	DFO Newfoundland and Labrador - SARMD

#### 5. ECOSYSTEM MANAGEMENT PERMIT DECISION

☐ **A SARA Section 73 Permit is not considered necessary to engage in the proposed activities.**

☒ **Issue SARA Section 73 Permit subject to the conditions outlined in the SARA Section 73 Permit for DFO-MAR-2017-17**

☐ **Do not issue Section 73 Permit.**

#### 6. SIGN-OFF

Reviewed by:

\_\_\_\_\_  
Donald Humphrey  
Regional Manager  
Species at Risk Management Division (Maritimes  
Region)

\_\_\_\_\_  
Date

## MacDonald, Jennifer

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**From:** Chris Fischer <chris@oceanarch.org>  
**Sent:** October-02-18 4:07 PM  
**To:** Robert Hueter  
**Cc:** MacDonald, Jennifer; Humphrey, Donald; Ami  
**Subject:** Re: SARA Permit (DFO-MAR-2017-17b) - amendment

Super grateful!  
Can't wait for some ship time together.  
Come on out!  
Best,  
C

Chris Fischer  
Founding Chairman  
Oceanarch  
[www.Oceanarch.org](http://www.Oceanarch.org)

On Oct 2, 2018, at 3:31 PM, Robert Hueter <[rhoeter@mote.org](mailto:rhoeter@mote.org)> wrote:

Hi Jenn:

This compromise should work for us. We're heading back into the Lunenburg dock right now to ride out the weather coming through today and tomorrow, and should be back out on Thursday morning. That will give us about 6-7 days left to fish before our expedition ends. So 3 immature sharks should work fine for us at this point as we haven't tagged any as per your previous instructions. We have extensive photos of every shark we tag so will pull out clasper photos as requested and include those in our SARA Report due Dec 31.

THANK YOU SO MUCH for all your help to push this through. I know you have many, many demands on your time and we are very grateful that you got this amendment approved.

Invitation to come to the ship remains open for you and Donald!

Best regards,  
Bob

**ROBERT E. HUETER, Ph.D.**  
*Senior Scientist & Director, Center for Shark Research*  
*Perry W. Gilbert Chair in Shark Research*  
*Manager, Sharks & Rays Conservation Research Program*  
*Mote Marine Laboratory*  
*1600 Ken Thompson Parkway*  
*Sarasota, FL 34236 USA*

*Chief Science Advisor, OCEARCH*

[rhuetter@mote.org](mailto:rhuetter@mote.org)  
Tel: 941-388-1827  
Fax: 941-388-4312  
More info at: [www.mote.org](http://www.mote.org)

On 10/2/2018 2:07 PM, MacDonald, Jennifer wrote:

Hello Bob and Chris,

Attached is the amended Species at Risk Act Section 73 Permit issued to OCEARCH, reflecting your request to amend condition 2.15. Please review the permit and all conditions carefully, specifically condition 2.15 has been amended to read:

*2.15 Of the 20 White Sharks that may be tagged, SPOT tags may be applied to a maximum of three (3) immature individuals. All other White Sharks to be tagged shall be mature individuals (defined as either greater than 3.5 metres in total length or by the presence of calcified claspers).*

An additional condition has been added (3.15), in relation to the collection of photographic evidence of the clasper calcification.

As with the original permit, you should keep a printed copy of the signed permit onboard at all times and ensure all members of the research team are familiar with all of the conditions of the permit.

Thank you,  
Jenn

**Jennifer MacDonald**

Species at Risk Biologist | Biologiste des espèces en péril  
Species at Risk Management Division | Division de la gestion des espèces en péril  
Ecosystem Management | Gestion des écosystèmes  
Fisheries & Oceans Canada | Pêches & Océans Canada  
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Fisheries and Oceans Canada  
Pêches et Océans Canada

SARA Permit No: DFO-MAR-2017-17b

## PERMIT ISSUED UNDER SECTION 73 OF THE SPECIES AT RISK ACT

Subject to the conditions described in this permit, the holder of this permit ("Permit Holder"), or any qualified person acting under the authority of the Permit Holder, is authorized under the authority of subsection 73(1) of the *Species at Risk Act*, S.C. 2002, c.29 (SARA) to engage in activities (as described in this permit) that **harm, harass, capture, and possess** individuals of the following threatened or endangered aquatic species listed on Schedule 1 of SARA:

**White Shark** (*Carcharodon carcharias*), Atlantic population

### Permit issued to:

Name: OCEARCH ("Permit Holder")  
 Attention to: George Christopher Fischer  
 Address: 1790 Bonanza Drive, Suite 101B  
 Park City, Utah, USA 84060  
 Email: [chris@oceanarch.org](mailto:chris@oceanarch.org)  
 Phone: (435) 645-8990 (office) [REDACTED] (cellular)

The following individual operating under the authority of OCEARCH as "Permit Holder", and those under his supervision, may undertake the activities authorized by this permit:

Name	Organization
Robert Hueter	Mote Marine Laboratory

### Location of Proposed Activity

**This permit is only valid at the following location(s):**

Nearest community (city, town, village): N/A

Municipality, district, township, county: N/A

Province: N/A

Name of watercourse(s), waterbody(ies): **Atlantic Ocean**

Specific location: **Within the Maritimes Region of Fisheries and Oceans Canada**

### Valid Permit Period

This permit is valid from **August 1, 2018** until **November 30, 2018**

The permit was modified (Amendment 1) on **September 25, 2018**.

The permit was modified (Amendment 2) on **October 1, 2018**.

If the Permit Holder cannot complete the activity during this period, Fisheries and Oceans Canada (DFO) must be notified in advance of the expiration of the time period, as soon as the Permit Holder is aware.

The period during which other conditions of this permit must be complied with are provided in their respective sections below. DFO may, where appropriate, amend this permit. In cases where the Valid Permit Period is extended, written notice and/or an amended permit will be provided to the Permit Holder.

Canada

.../2

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### **Description of the Activity**

The purpose of the activity is to conduct scientific research on White Sharks in Canadian waters to gain a better understanding of the role of Canadian waters in the life history of the White Shark population in the northwest Atlantic Ocean, the range of the species within Canadian waters and health of White Sharks. The researchers will attach acoustic and satellite tags, as well as collect various biological samples, from up to 20 sharks in Canadian waters.

The study area includes:

- Mahone Bay;
- Bay of Fundy; and
- Scotian Shelf.

Researchers will use chum to attract White Sharks in the study area to the fishing boat and larger research vessel. When a White Shark is sighted, either visually or using a drone, the fishing boat will target its fishing activities to attract and capture that shark. Chum bags, chum boxes, bait tanks, chum tubes and decoys may all be used to attract White Sharks to the fishing vessel. Once a White Shark is in the vicinity of the fishing vessel, the researchers will attempt to catch the shark using a 20/0 circle hook (zero offset) with a bite-blocker attached. In the case of a very large White Shark, a 27/0 circle hook (zero offset) with a buoy to prevent swallowing of the hook will be used. Once caught, the White Shark will be guided onboard the hydraulic lift on the research vessel, which will then be raised above the waterline. While on the lift, sharks will be provided with oxygenated seawater via a mouthpiece and tube.

Once on the lift, internal acoustic tags will be implanted surgically in the coelomic cavity and the incision will be sutured. Smart Position and Temperature (SPOT) tags will be attached on the leading edge of the first dorsal fin by drilling four holes in the dorsal fin with an electric drill and attaching the tag with nylon bolts, stainless steel locknuts and plastic spacers. The hardware is designed to retain the tag for five years after which it will fail and the tag will detach. Up to 20 White Sharks will have both acoustic and SPOT tags applied. Pop-up Archival Satellite Tags (PSAT) will be attached via a tether to a subdermal metal dart implanted in the shark's flank below the first dorsal fin. PSAT tags will be attached to up to 6 White Sharks caught.

The researchers will also collect samples (blood, muscle, semen, fecal and urine samples), conduct skin, gill and cloacal swabs, collect parasites, collect eye and tail measurements, and perform an ultrasound (females). Samples will be collected using a hypodermic puncture and biopsy punch.

The activities authorized by this permit consist of:

- Actively attracting White Sharks to a vessel;
- Catch and release of White Sharks;
- Lifting individuals out of the water on a hydraulic lift;
- Collecting blood and tissue samples;
- Implanting internal acoustic tags; and
- Attaching SPOT and PSAT tags.

The effects that the activity may cause to the listed wildlife species and the effects of those changes authorized by this permit are as follows:

- Harm, harassment, capture and possession of listed aquatic species at risk.

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**Terms and Conditions of Permit**

The activity must be carried on in accordance with the following conditions:

**1. General Conditions**

- 1.1. A copy of this permit shall be kept on site at all times in the possession of the Permit Holder or a person acting under the Permit Holder's authority, and shall be made available to an enforcement officer upon request.
- 1.2. All persons undertaking the activity under the authority of the Permit Holder shall do so under the direction and oversight of the Permit Holder and shall be made familiar with the conditions of this permit.
- 1.3. The activity must comply with the conditions identified within this permit. Activities that affect individuals of species at risk, their residences, or their critical habitat, other than those specifically identified within this permit are not authorized under this permit.
- 1.4. No changes to the Permitted activities shall take place without prior consultation with DFO, and written approval from DFO, Species at Risk Management Division. Contact information as follows:

**Species at Risk Management Division**  
**Fisheries and Oceans Canada**  
**P.O. Box 1006**  
**Dartmouth, NS, B2Y 4A2**  
**email: [SpeciesatRisk.xmar@dfo-mpo.gc.ca](mailto:SpeciesatRisk.xmar@dfo-mpo.gc.ca)**  
**phone: 1-866-891-0771 fax: 1-902-426-2331**

**2. Conditions to avoid or minimize the impact of the activity on the species:**

- 2.1. To the extent possible, activities shall be conducted in a manner whereby any individuals of the species shall be handled only in the circumstances authorized under this permit and with the least amount of harm.
  - 2.2. Activities shall only be conducted in the study area described above. If activities are to be conducted outside the study area, DFO shall be notified in advance using the contact information in condition 1.4.
  - 2.3. Only individuals that are experienced in tagging large pelagic fishes shall tag White Sharks.
  - 2.4. White Sharks shall not be chased by the vessel.
  - 2.5. The following gear shall be used: circle hooks (either 20/0 or 27/0 with zero offset) rigged with a cross bar bit-blocker (30cm up the leader) and attached to a stainless steel wire rope (3/32" or 1/8"). The leader shall be 10m in length and shall be attached to a braid rope with elasticity properties. Leaders shall be embedded inside a three-strand rope to increase the diameter.
  - 2.6. Individual White Sharks shall not be kept on the research platform for longer than 20 minutes.
  - 2.7. While on the research platform, oxygenated seawater shall be pumped through a hose and mouthpiece into the shark's buccal cavity at all times.
  - 2.8. While on the research platform, a tail rope shall be used to prevent the animal from causing harm to itself and others.
  - 2.9. While on the research platform, the animal's head and eyes shall be covered with wet towel to reduce animal stress and keep eyes moist.
  - 2.10. While on the research platform, the animal's skin shall be kept wet.
  - 2.11. While on the research platform animal stress shall be monitored by observing skin colouration, presence of blood pooling, gill movements, and animal activity. If acute stress is observed, the animal shall be released immediately.
  - 2.12. The total time of engagement with a single White Shark from the time it is initially hooked until it is released shall be limited to 40 minutes.
  - 2.13. No more than 20 White Sharks, in total, shall be tagged.
  - 2.14. No attempts shall be made to tag White Sharks that are injured or behaving abnormally.
  - 2.15. Of the 20 White Sharks that may be tagged, SPOT tags may be applied to a maximum of three (3) immature individuals. All other White Sharks to be tagged shall be mature individuals (defined as either greater than 3.5 metres in total length or by the presence of calcified claspers).
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- 2.16. A DFO representative shall be onboard as an observer during a subset of the expedition to be determined by DFO.
- 2.17. In the event of a mortality or significant injury being sustained by a White Shark during a tagging attempt, all further attempts at tagging shall cease and DFO shall be contacted immediately using the contact information in condition 1.4. No further attempts at catching or tagging White Sharks shall be resumed until approved by DFO.

**3. Conditions that relate to monitoring and reporting:**

- 3.1. By December 31st, 2018, irrespective of whether the Permitted activities took place, a SARA Section 73 Permit Report shall be completed and returned to the Species at Risk Management Division using the contact information provided in condition 1.4. Without limiting the generality of the foregoing, the report shall contain the following information, to the satisfaction of DFO in its sole discretion:
  - 3.1.1. to demonstrate that measures and standards to avoid and mitigate the impacts of the permitted activities on the species were implemented according to the conditions of this permit;
  - 3.1.2. an assessment of whether the measures and standards mentioned in condition 3.1.1 were successful at avoiding and mitigating the impacts of the permitted activities on the species;
  - 3.1.3. details of any contingency measures that were followed to prevent impacts greater than those authorized by this permit;
  - 3.1.4. for any interaction with, or sighting of, a White Shark, report the following: date, time, location, length, size, gender (specify if females are pregnant or not), condition of the individual; and identify if tagging was attempted or undertaken on that individual;
  - 3.1.5. for any sexually mature White Shark less than 3.5 m that is SPOT tagged, provide photographic evidence that is date and location stamped showing clasper calcification; and
  - 3.1.6. provide details of any tagging attempts, including whether tagging was successful, unplanned or unexpected impacts on the shark, reaction of the shark to the tagging, and lessons learned.

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**Authorization Limitations and Application Conditions**

This permit cannot be transferred or assigned to another party. If the activity authorized under this permit is sold or transferred to another party, or if other circumstances arise that result in another party taking over the activity, the Permit Holder shall advise DFO in advance if the ownership or responsibility for the activity is expected to change.

The failure to comply with any condition of this permit is an offence under section 97 of SARA and might result in charges being laid under SARA.

This permit may be revoked or amended to ensure the survival or recovery of White Shark. Without limiting the generality of the foregoing, DFO may:

- suspend any permitted activities to avoid or mitigate additional adverse direct or indirect effects to White Sharks;
- amend or revoke this permit; and
- direct the Permit Holder to carry out at the Permit Holder's expense any modifications or actions deemed necessary by DFO to avoid or mitigate existing impacts or to avoid further adverse direct and indirect impacts to White Sharks.

This permit is valid only with activities and species listed herein and for no other purposes. It does not authorize the Permit Holder to kill, buy, sell, or trade an individual of a wildlife species that is listed as extirpated, endangered or threatened, or any part or derivative of such an individual. This permit does not purport to release the Permit Holder from any obligation to obtain permission from or to comply with the requirements of any other regulatory agencies.


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Date of Issue: April 30, 2018

Date of Amendment: **OCT 02 2018**

Signature of authorizing officer: \_\_\_\_\_

  
Donald Humphrey  
Manager, Species at Risk Management Division  
Maritimes Region  
Fisheries and Oceans Canada  
1 Challenger Drive, P.O. Box 1006, Dartmouth, NS, B2Y 4A2

Further information about this permit is available from the above authorizing officer ([Donald.Humphrey@dfo-mpo.gc.ca](mailto:Donald.Humphrey@dfo-mpo.gc.ca)).

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## **MacDonald, Jennifer**

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**From:** MacDonald, Jennifer  
**Sent:** October-04-18 2:21 PM  
**To:** Sullivan, Katrina  
**Subject:** OCEARCH permit amendment  
**Attachments:** SARA-Permit-2017-07(OCEARCH)-Amendment2\_Final.pdf

**Categories:** To file

Hi Katrina,

I just wanted to let you know that OCEARCH is here in NS and tagging White Sharks. Earlier this week, they sent us a request to amend their permit with respect to the condition 2.15 (only sharks over 3.5 m could be SPOT tagged). Our original assessment was based on information that SPOT tags may impact fin development in immature sharks and the size was based on published sizes at maturity. However, OCEARCH requested two other factors to be considered: (1), that an assessment of maturity be based on either size or the presence of calcified claspers (in males), as they had data suggesting that males may mature at less than 3.5m; and (2) that we consider allowing them to tag immature sharks as well.

I've attached the permit showing the amendments to condition 2.15 – to be precautionary, we allowed up to 3 immature white sharks to be SPOT tagged (I can send along the revised assessment form as well if you want), as well as indicating that maturity may be based on either size or observation of calcified claspers.

It doesn't sound like OCEARCH is planning to come up to Newfoundland on this expedition, so will not be an issue for you, but just wanted to loop you in.

Jenn

### **Jennifer MacDonald**

Species at Risk Biologist | Biologiste des espèces en péril

Species at Risk Management Division | Division de la gestion des espèces en péril

Ecosystem Management | Gestion des écosystèmes

Fisheries & Oceans Canada | Pêches & Océans Canada

P.O. Box 1006 Dartmouth N.S. | C.P. 1006 Dartmouth N.E. B2Y 4A2

Tel | Tél: (902) 407-8175 Fax | Téléc: (902) 426-2331

Email | Courriel: [jennifer.macdonald@dfo-mpo.gc.ca](mailto:jennifer.macdonald@dfo-mpo.gc.ca)



FILE NO: DFO-MAR-2017-17  
17-PNFL-00020

**Ecosystem Management – Assessment and Approval of  
Species at Risk Act (SARA) Section 73 Permit Application**

**1. APPLICANT INFORMATION**

Permit Renewal? ☐ Yes ☒ No  
Permit Amendment? ☒ Yes ☐ No  
Is this a multi-year permit application? ☐ Yes ☒ No  
If so, what is the starting year and ending year:  
Previous Permit Number(s): n/a

Text in yellow below represents the information amended since the original permit was issued.

**Individual(s) or Organization to appear as the Licensee on the Permit**

Name: OCEARCH  
Contact: George Christopher Fischer  
Email: chris@oearch.org  
Address: 1790 Bonanza Drive, Suite 101B  
Park City, Utah, USA 84060  
Phone: 435-645-8990

The following individuals and those under their direct supervision may undertake the activities authorized by the permit:

Name	Organization
Robert Hueter	Mote Marine Laboratory

**2. ACTIVITIES INFORMATION**

a) **Listed Species Affected:** White Shark (*Carcharodon carcharias*), Atlantic population - Endangered

**b) Project Summary:**

OCEARCH is proposing to conduct scientific research on White Sharks in Canadian waters to provide information in relation to a number of questions, including understanding the role of coastal waters off Nova Scotia and Newfoundland in the life history of the White Shark population, the range of the White Shark population in the northwest Atlantic, the health of White Sharks inhabiting Canadian waters, and adaptations of White Sharks for northwest Atlantic waters.

OCEARCH is proposing to conduct a research expedition in Canadian waters in September/October 2018, involving a collaborative team of scientists who will be onboard and collecting data to support a number of research projects. Sharks will be caught and guided to a research platform on the M/V OCEARCH. Research procedures (sampling and tagging) will be carried out on board the vessel, following which the animals will be released live. OCEARCH has requested a permit to tag 20 sharks in Canadian waters based on their analysis that 60 sharks are required for their various research studies (20 young-of-the-year, 20 immature and 20 mature); to date OCEARCH has tagged 33 sharks in the north Atlantic.

Actively attracting White Sharks to the fishing boat and the larger research vessel will be carried out by placing chum in the water using a variety of techniques. Observers on board the vessel scan for

signs of White Shark activity and OCEARCH also makes use of drones, to search for White Sharks. To attract sharks, a combination of chum bags, chum boxes, bait tanks, chum tubes and decoys are used. The chum consists of whale blubber and oil, mackerel and tuna, and/or menhaden oil. OCEARCH will seek a marine mammal permit from DFO to authorize the use of marine mammal material in Canadian waters.

White Sharks will be caught from the fishing boat using a circle hook (20/0 or 27/0 with zero offset). The hooks will be rigged with a crossbar bite-blocker (30cm up the leader) to prevent the shark from swallowing the bait. The hook will be attached to stainless steel wire rope (3/32" or 1/8"); the leader is about 10m and will be attached to a braid rope with elasticity properties to reduce hard shock when the initial struggle ensues. Typically within 5-10 minutes of being caught, the White Shark is guided onto the hydraulic lift on the research vessel.

White Sharks will be lifted out of the water on a hydraulic lift that is lowered off the research vessel. The lift, which includes side guides and an end gate to prevent the shark from swimming off, will be lowered below the waterline and the shark guided on. The lift will then be slowly raised above the water. Once on the lift, the hook will be removed from the shark's jaw. Oxygenated seawater will be pumped through a hose and mouthpiece (allowing for simultaneous flushing of the gills on both sides of the head) into the shark's buccal cavity at all times while on the lift. The shark will be on its side for the initial 5-7 minutes (to take blood samples, implant the acoustic tag, perform ultrasound) then it is rolled to an upright position (to attach satellite tag). Other procedures undertaken while the White Shark is on the lift will be the collection of swabs (skin mucus, gill surface and cloacal swabs); collection of parasites, collection of semen, fecal, and muscle samples, as well as possibly urine samples if the animal urinates while on deck, and the collection of eye and tail measurements.

Blood and tissue sampling will be conducted while White Shark are onboard the vessel. A hypodermic puncture and biopsy punch will be used to obtain blood (<25ml), muscle (<5g), semen, and skin mucus samples.

Implantation of internal acoustic tags will be conducted by making a surgical incision to insert a sterilized transmitter (1cm x 6cm) into the coelomic cavity. The incision will be sutured and the sutures will be absorbed over a period of time. OCEARCH is proposing to insert the internal acoustic tags in every White Shark (up to 20) caught in Canadian waters under this permit application.

Attachment of satellite tags will be conducted by drilling and bolting Smart Position or Temperature (SPOT) tags on the leading edge of the first dorsal fin. The SPOT tags (Wildlife Computers Model SPOT-257) measure 162 x 57 x 20 mm and weigh 160 g. To attach the tag, four holes are drilled in the dorsal fin with an electric drill (drill bit will be cleaned and sterilized in alcohol before use). The tag will be attached with alcohol-sterilized nylon bolts, stainless locknuts and plastic spacers (standard hardware from the tag manufacturer). Tags will be coated with an antifouling compound. The hardware is designed to retain the tag for five years, after which it will fail and the tag will detach. OCEARCH is proposing to attach a SPOT tag to every White Shark (up to 20) caught in Canadian waters under this permit application.

Pop-up Satellite Archival Tags (PSAT) will be attached via a tether to a subdermal metal dart implanted in the shark's flank below the first dorsal fin. PSAT tags are provided to OCEARCH by a collaborator at the Woods Hole Oceanographic Institution. The number of tags has not been confirmed, but will likely be 4-6 tags. The PSAT tags will be attached, in addition to acoustic and SPOT tags, on 4-6 White Sharks.

OCEARCH is also potentially looking to use a prototype tag that is a combination of a PSAT and SPOT tag. The tag is attached via a darted tether in the same way as a PSAT tag. If these new prototype tags are available, they will be used instead of the PSAT tag on 4-6 White Sharks. As these are prototype tags, OCEARCH is proposing to use these tags in combination with the SPOT tags to validate the new tag's geolocation data.

c) Analysis of Proposed Activities:

<b>Location:</b> Atlantic Ocean				
Coastal Nova Scotia:				
<ul style="list-style-type: none"> <li>• Mahone Bay (44° 29.50' N / 64° 13.50' W and adjacent areas</li> <li>• Bay of Fundy (44° 54.00' N / 66° 32.50' W and adjacent areas</li> </ul>				
South Coast of Newfoundland:				
<ul style="list-style-type: none"> <li>• Placentia Bay (47° 05.00' N / 54° 32.00' W</li> </ul>				
Sable Island (43° 56.14' N / 59° 56.59' W)				
<b>Dates:</b> September 18-October 11, 2018				
Proposed Activity	Planned Effects/Outcome		Potential Incidental Effects/Outcome	
	Prohibitions that Apply	Likelihood of the prohibited impact(s)	Prohibitions that Apply	Likelihood of the prohibited impact(s)
Actively attracting White Sharks to a vessel (i.e., chumming)	Harass	Med	Harm Kill	Low Low
Capture of White Sharks	Harass Harm Capture	High Low High	Kill	Low
Lifting White Sharks out of the water	Harass Harm Capture	High Low High	Kill	Low
Blood and tissue sampling	Harass Harm Possess	Med Low High	Harm	Low
Implantation of internal acoustic tags	Harass Harm	Med Low	Kill	Low
Attachment of satellite tags – SPOT tags	Harass Harm	Med Low	Kill	Low
Attachment of satellite tags – PSAT tags	Harass Harm	Med Low	Kill	Low

Impacts to individual White Sharks would result from any distress associated with the approaching vessel, being caught and brought onboard the vessel and out of the water, the application of the different tag types and the collection of biological samples.

**Actively attracting White Sharks to a vessel (i.e., chumming)**

A number of studies suggest that the presence of chum may be linked to modification of White Sharks' normal swimming and/or hunting behaviours, although the effects are likely short term when chum is used for short term research projects.<sup>1</sup> It is possible that attracting a White Shark will cause the individual to stray from patrolling for food or from mating. Disturbance to normal feeding behaviours may result in energetic costs.<sup>2</sup>

There is a possibility that attracting sharks to the fishing boat or the research vessel may result in collisions between the shark and the vessel and that the presence of the vessel may cause behavioural changes.

<sup>1</sup> NOAA. 2014. Draft Programmatic Environmental Assessment of Potential White Shark Research and Education Projects within the Gulf of the Farallones and Monterey Bay National Marine Sanctuaries. [https://nmsanctuaries.blob.core.windows.net/sanctuaries-prod/media/archive/library/pdfs/qfome\\_draft\\_white\\_shark.pdf](https://nmsanctuaries.blob.core.windows.net/sanctuaries-prod/media/archive/library/pdfs/qfome_draft_white_shark.pdf)

<sup>2</sup> Semmens, J.M., Payne, N.L., Huveneers, C., Sims, D.W. & Bruce, B.D. 2013. Feeding requirements of White Sharks may be higher than originally thought. Sci. Rep. 3, 1471; DOI:10.1038/srep01471 (2013).

### **Catch of White Sharks**

Catch and release fishing is a source of stress to White Sharks due to the potential for long fight times (exhausting the individuals) and injury from wounds caused by the hooks. Long capture times have been known to kill bony fish and other sharks.<sup>3</sup> Physiological disruptions to fish result from the high anaerobic activity, muscle fatigue and time spent out of water caused by capture using most fishing techniques.<sup>4</sup>

Injury can result from the wound caused by the hook, although the extent of the tissue damage or injury will depend on the location of the hook and the type of gear. Sub-lethal injury can result from removing hooks or leaving them in place in the throat, esophagus or gut. In the short term, a hook in the mouth will cause a loss of blood, but the wound would be expected to heal within a year or less. Circle hooks are known to cause lower incidences of internal injury than conventional J hooks.<sup>5</sup>

Although not specific to White Shark, a study in Australia examined post release survival in Shortfin Mako by attracting individuals to a boat using chum, then using monofilament line and either J hooks or circle hooks to catch the sharks. The study showed that the length of the fight time did not impact survival. Circle hooks significantly reduced foul hooking. The study showed that hook choice affected the likelihood of mortality, while the species is able to cope with long fight times and associated physiological responses to capture due to its endothermy and high aerobic scope.<sup>6</sup>

It has been suggested that sharks, in general, are capable of recovery from physiological stress associated with capture and that any mortality is more likely linked to the extent of any physical injuries.<sup>7</sup>

### **Lifting White Sharks out of the water**

The research platform is raised and the White Sharks are lifted from their natural, in-water environment. This removal from the water likely results in physiological stress and possible oxygen deprivation.

Lifting White Sharks out of the water, onto a hard raised platform, may create excessive pressure on tissues and organs that usually do not bear weight. This impact may be greater in larger individuals.

While there are concerns about damage to internal organs, there is no evidence reported of internal organs being crushed when sharks are removed from the water.<sup>8</sup> However, if sharks are thrashing on the deck, this could lead to internal injuries.

OCEARCH has taken blood samples in the first minute and the last minute on the lift for 120 White Sharks handled in this manner and found stress levels remain relatively low throughout the handling time. Higher amounts of stress due to capture were shown in very young White Sharks (however OCEARCH is not proposing to catch young sharks in Canadian waters).

### **Blood and tissue sampling**

The *Canadian Council on Animal Care Guidelines on Care and Use of Fish in Research* suggest that blood samples be up to 1ml/kg body size. The volume proposed to be collected by this project is well under this recommended amount.

The retention of the blood and tissue samples involves possession of parts of individuals.

### **Implantation of internal acoustic tags**

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<sup>3</sup> NOAA 2014

<sup>4</sup> Skomal, G.B. 2007. Evaluating the physiological and physical consequences of capture on post-release survivorship in large pelagic fishes. *Fisheries Management and Ecology*. 14: 81-89.

<sup>5</sup> NOAA 2014

<sup>6</sup> French R.P., Lyle J., Tracey S., Currie S., Semmens J.M. 2015. High survivorship after catch-and-release fishing suggests physiological resilience in the endothermic shortfin mako shark (*Isurus oxyrinchus*). *Conserv Physiol* 3: doi:10.1093/conphys/cov044.

<sup>7</sup> Skomal 2007

<sup>8</sup> NOAA 2014

Implanting internal acoustic tags requires making a surgical incision, from which there could be a risk of infection or causing harm to the individual.

#### **Attachment of satellite tags (SPOT and PSAT)**

In terms of physical injury associated with the tagging, shark species in general are very resilient to superficial cuts and have a tremendous capacity to heal from injury.<sup>9</sup> Similar and much more extensive lacerations occur frequently during mating behaviours, and one of the identifying characteristics of a mature female shark is deep scarring along her dorsal musculature. The tagging site is expected to close over very quickly with minimal effect on the animal, as has been observed in other species held in captivity after tagging.

Various studies have examined possible longer term effects of electronic tags or data loggers on the swimming efficiency of sharks, but results have been variable.<sup>10</sup> There may be a marginally increased drag while swimming due to the external tag.

A study from South Africa suggests that SPOT tags can cause permanent cosmetic and structural damage to the dorsal fins of White Sharks, depending on how long the tag is attached for. Tags that detach within 12-24 months did not seem to cause long term damage; while after 24 months permanent damage to the dorsal fin was reported. However, the study did not show that the damage to the dorsal fin resulted in impacts to long term survival or body growth.<sup>11</sup>

Research from Monterey Bay Aquarium also showed that real-time satellite tags attached with multiple bolts on juvenile White Sharks affects the growth of the dorsal fin (growing around the tag or causing a deflection to the tip of the fin). They suggested that there may be more of a reaction to the presence of the bolts and tag in growing tissue.<sup>12</sup>

OCEARCH has provided photographs of White Sharks observed years after tagging that show that the fins have healed and are functioning properly.

#### **Post Release Behaviour and Longer Term Effects**

Results from research in which White Sharks were caught and restrained using an in-water stretcher and then tagged, has shown a six to 48-hour recovery period for individuals after capture and tagging.<sup>13</sup>

Post-release behavioural studies by OCEARCH collaborating scientists using accelerometers attached to the sharks have shown recovery and resumption of natural swimming behaviour within approximately 6 hours after release.

Research conducted off the west coast of California that involved tagging 21 White Sharks (2007-2012), found that they resumed 'normal' behaviours after tagging, as determined by their migration patterns. These sharks were tagged with SPOT tags (using various methodology including being lifted onto a platform out of the water and being tagged while alongside the research boat).<sup>14</sup>

It has been suggested that catch and release of marine pelagic fish may have sublethal population level effects due to reduced individual fitness. However, as these population level effects are difficult to assess in highly migratory species with poorly understood life histories, this has not been quantified or studied in depth.<sup>15</sup>

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<sup>9</sup> NOAA 2014

<sup>10</sup> Hammerschlag, N., 2011. A review of shark satellite tagging studies. J. Exp. Mar. Biol. Ecol. doi:10.1016/j.jembe.2010.12.012

<sup>11</sup> Jewell O.J.D., Wolsel M.A., Gennari E., Towner A.V., Bester M.N. 2011. Effects of Smart Position Only (SPOT) Tag Deployment on White Sharks *Carcharodon carcharias* in South Africa. PLoS ONE 6(11): e27242. doi:10.1371/journal.pone.0027242

<sup>12</sup> NOAA 2014

<sup>13</sup> NOAA 2014

<sup>14</sup> NOAA 2014

<sup>15</sup> Skomal 2007

As little is known about White Shark mating behaviour, it is unknown whether tagging could have an impact on mating.<sup>16</sup>

There is anecdotal evidence of at least one White Shark having died following interactions with OCEARCH using the methods proposed here.

#### Summary

Based on the above assessment, the following activities have the potential to contravene the SARA prohibitions and therefore must be authorized under SARA:

- Actively attracting White Sharks to a vessel;
- Catch and release of White Sharks and lifting individuals out of the water on a hydraulic lift;
- Collecting biological samples from White Sharks;
- Implanting internal acoustic tags; and
- Attaching SPOT and PSAT tags to White Sharks.

The effects that these activities may cause to White Sharks include:

- Capture and harassment of, and potentially harm to, individuals,
- Possession of samples from individuals, and
- Although unlikely, killing of, individuals.

The Species at Risk Management Division has concluded that the activities associated with the above project are likely to affect the White Shark, Atlantic population, in a manner that is prohibited by SARA, and therefore a SARA Section 73 permit is considered necessary to engage in the proposed activities.

### 3. REGULATORY ASSESSMENT OF APPLICATION

#### Necessity Assessment

Work through the following five questions to determine the appropriate action for DFO to take in response to the permit application.

1. Is it likely that one or more species listed on Schedule 1 of the SARA occurs at any of the locations identified for the proposed activities?

☒ Yes ..... Go to next question  
☐ No .....

**A SARA permit is not necessary. The applicant will be informed in writing and advised to ensure any other required authorizations are obtained before proceeding with the activities. Go to Assessment Summary.**

2. Are any of the SARA-listed species concerned considered an "Aquatic Species" as per the definition in the *Fisheries Act*?

☒ Yes ..... Go to next question  
☐ No .....

**The applicant will be directed to resubmit the application to the appropriate agency. Go to Assessment Summary.**

3. Are the locations at which any of the activities are proposed to take place under the jurisdiction of Fisheries and Oceans Canada?

☒ Yes ..... Go to next question  
☐ No .....

**The applicant will be directed to resubmit application to the appropriate agency. Go to Assessment Summary.**

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<sup>16</sup> NOAA 2014

4. Is it certain or likely that performing any of the proposed activities will affect the SARA-listed species concerned in a way to contravene the general prohibitions of SARA (subsections 32(1), 32(2), section 33, subsections 38(1), 58(1), 60(1) and 61(1))?

☒ Yes ..... Go to next question  
☐ No .....

A SARA permit is not necessary. The applicant will be advised of this in writing. Go to Assessment Summary.

5. Do any of the exceptions listed in SARA Section 83 apply to the proposed activities concerned?

☐ Yes .....  
A SARA permit is not necessary. The applicant will be advised of this in writing and the basis on which an exception applies will be described here. Go to Assessment Summary.

☒ No .....  
A SARA Section 73 permit is required to avoid contravention of the prohibitions of SARA. DFO will proceed with the application to assess eligibility. Go to Eligibility Assessment.

#### Eligibility Assessment

The following two questions assess whether the proposed activities are eligible for a SARA Section 73 permit.

1. Section 73(2): The purpose of the proposed activities is described by *one or more* of the following:

- ☒ The activity is scientific research relating to the conservation of SARA-listed species and will be conducted by qualified persons
- ☐ The activity benefits the species or is required to enhance its chance of survival in the wild.
- ☐ Affecting the SARA-listed species is incidental to carrying out the activity

The proposed activities aim to answer a number of research questions, both through the tracking of individual White Sharks that will be tagged and through analysis on blood and other tissue samples.

The draft Recovery Strategy for White Shark identifies the following as high priority research and management approaches:

- undertake scientific research to better understand population dynamics, distribution and habitat use.
- collect and maintain White Shark sightings information; maintain this information in a database and share via network

OCEARCH's Chief Science Advisor is Dr. Robert Hueter. He is the Director of the Center for Shark Research at the Mote Marine Laboratory and has more than 25 years experience in shark research.

☒ Yes ..... Go to next question  
☐ No .....

The proposed activities are not eligible for a SARA Section 73 Permit. Go to Assessment Summary.

2. Section 73(3): The proposed activities meet *all* of the following pre-conditions:

- ☒ All reasonable alternatives to the activity that would reduce the impact on the species have been considered and the best solution has been adopted

In the consideration of alternatives to the proposed research, there are a number of alternatives that should be considered. The first alternative to consider would be to not undertake the activity and not conduct the research; however, given the many unknowns about the species this would not represent



the best solution as it would be a loss of an opportunity to learn more.

There are no alternative locations to conduct the research, as it must be conducted within the range of the species.

In relation to the proposed activities, overall the applicant asserts that the methods and procedures proposed are the safest and most successful way of obtaining the necessary samples and attaching SPOT tags.

#### Attracting and Catching White Shark

- The alternative to chumming for White Shark is to not use chum, which would limit the ability to sight White Sharks to passive observations. Given the low numbers in a large area, chance encounters would be low, which would reduce or even eliminate the success rate of researchers attempting to deploy tags or obtain samples.

#### Catching, restraining and lifting the shark out of the water

- Alternative approaches include (1) attracting a shark and sampling/tagging it without restraining or catching it and (2) attracting a shark and catching it, but conducting sampling/attaching tags while the shark remains in the water.
- The following summarizes the type of tagging and sampling that is possible under each alternative:

	(1) No Capture	(2) Capture and Tag in Water	(3) Capture and Use of Lift
Tag Types	PSAT Acoustic (external)	SPOT PSAT Acoustic (external)	SPOT PSAT Acoustic (internal or external)
Other Samples	- muscle samples	- blood samples - swabs (skin mucus) - muscle samples	- blood samples - swabs (skin mucus, gill surface and cloacal swabs) - muscle samples - parasite samples - semen samples - fecal samples - urine samples (opportunistic) - eye/tail measurements - ultrasound

- Under alternative (1), the success rate for tagging and collecting samples would likely be less than using one of the alternative methodologies, which involve catching the sharks. This approach can also require chasing the individuals with a small to mid-sized boat, which can increase stress levels. There is a risk with this approach that tags would not be attached properly.
- Under alternative (2), some researchers have suggested that keeping the shark in the water reduces the stress experienced by the shark as a result of being lifted from the water. However, OCEARCH has indicated that sharks are more likely to struggle if they remain in the water, while being on the lift quiets the animals and therefore they conclude that the proposed method reduces the potential for harm to the sharks. Sampling and tagging using an alongside-boat method requires calm sea conditions, which are often not encountered. Working alongside a boat with a large animal that is likely to be struggling also increases the risk to researchers.
- With respect to the precise methodology proposed to capture sharks, the approaches proposed likely present the best alternative to reduce potential impacts. Alternatives would be to use a 'J' hook instead of a circle hook, to not use the bite blocker, to not embed the leaders in rope. However, all of these alternatives would increase the risk of internal (e.g., gut-hooking) or external (e.g., lacerations) injury to the sharks.

#### Blood and tissue sampling

- An alternative method to collecting biological samples, would be collect samples by harpoon, while the shark remains in the water. However, the collection of blood samples, swabs of the skin mucus, gill surface and cloacal, parasite collection and semen samples require catching and controlling the animal. Further, attempting to obtain samples in the water increases the risk of sample contamination, loss of sample and infections in the shark. Muscle samples are taken from the site of the PSAT tag attachment reducing sample wounds on the shark.

#### Tagging

- SPOT, PSAT and acoustic tags all collect different types of data:
  - SPOT tags transmit location and other data in real time. Information is transmitted while the tag is attached to the shark; the data signal from these tags is sent when the shark's dorsal fin is at the surface. SPOT tags may transmit data for up to 3-5 years. To obtain real-time geolocation data from an animal that is wide ranging within areas that are previously unknown, SPOT tags provide the best option for collecting this data.
  - Data from PSAT tags is stored on the device and retrieved after the tag detaches from the shark. PSAT tags will collect data for approximately one year. PSAT tags provide archived temperature and depth data, but the geolocation data is less precise and not available in real-time.
  - Acoustic tags are useful to detect the arrival of an animal in an area where underwater acoustic receivers have been deployed (typically well-studied inshore areas). These tags provide fine-scale geolocation data, but only in areas where there are acoustic receivers.
- OCEARCH has indicated that to understand an animal's large scale movements and migration, SPOT tags are the most effective in revealing the precise tracks and this data, in their perspective, cannot be substituted with data from PSAT or acoustic tags. Further, the real time data from SPOT tags support their educational and outreach objectives.
- There are alternative attachment methodologies for tags:
  - Acoustic tags can be attached externally rather than internally. While some researchers have successfully utilized externally attached acoustic tags, OCEARCH has indicated that there are concerns with the risk that external tags can be shed. In addition, internal tags have been shown to transmit for up to 5 years (and even up to 10 years), while external tags have a shorter lifespan of approximately 1 year. OCEARCH has further indicated that the internal tags do not cause on-going harm to sharks once implanted.
  - SPOT tags can also be attached as floating tags, however OCEARCH indicated concern that floating SPOT tags can be fouled, shed and lost from the animal very rapidly.
  - Other researchers have developed a technique to attach SPOT tags with a single bolt, rather than the four bolt attachment methodology proposed by OCEARCH. OCEARCH has indicated that their information indicates that the single bolt attachment has a shorter lifespan, limiting the data that can be collected. Additionally, the single bolt attachment requires a saddle in which the tag is placed when attached; this saddle may decrease hydrodynamics for the sharks on an on-going basis.

- ☒ All feasible measures will be taken to minimize the impact of the activity on the species or its critical habitat or the residence of its individuals

The following measures were proposed by OCEARCH to minimize the impacts of the activities:

- Individuals will not be chased by the vessel, but will be attracted using chum;
- gear will be used that will minimize the chance that animals are gut-hooked (including using circle hooks and a crossbar bite-blocker);
- animal struggles and injury will be minimized by:
  - using a leader attached to a braid rope with elasticity properties to help reduce hard shock during the initial struggle;
  - using a 10m leader length in case the shark rolls in the line to ensure that the shark cannot bite through the rope and escape (retaining the hook and leader);
  - embedding the leader inside a three-strand rope to give it a thicker diameter so that if the shark rolls, the thicker rope does not cut into the sharks' skin and is easier to unwrap;

- using heavier tackle that keeps enough pressure on the shark so that the line is stretched tight and the shark cannot turn and roll.
- all research procedures will be conducted within 20 minutes;
- while on the research platform:
  - oxygenated seawater will be pumped through a hose and mouthpiece (allowing for simultaneous flushing of the gills on both sides of the head) into the shark's buccal cavity at all times;
  - a tail rope will be used to prevent the animal from causing harm to itself and others;
  - the head and eyes will be covered with wet terrycloth towel to reduce stress and keep eyes moist;
  - skin will be kept wet during in-air procedures to prevent drying;
  - animal stress will be monitored by observing skin colouration, presence of blood pooling, gill movements, and animal activity:
    - if stress is detected in the animal, a blood sample will be taken to evaluate the shark's conditions;
    - if acute stress is observed, the animal will be released immediately.
- OCEARCH is currently seeking approval of their animal care plan from Jacksonville University and will notify DFO once that the approved plan is in place.

In addition, the permit will require that:

- the total time of engagement with a single White Shark be limited to 40 minutes (from the time it is initially hooked until it is released);
- a maximum number of 20 White Sharks can be tagged;
- as the impact on fin development of attaching SPOT tags has been shown to be greater in juvenile sharks<sup>17</sup>, the original permit limited tagging to individuals greater than 3.5 m total length, based on published data on size at maturity for males. The condition was re-evaluated upon a request from OCEARCH to consider SPOT tagging of both immature and mature individuals, as well as to reconsider how maturity in White Sharks is determined.
- While length (based on published data on size at maturity) is considered by some scientists to be the best tool to determine maturity in the field; in males, evidence of calcification of the claspers is also a good indication of maturity. Therefore, the permit condition is amended to indicate that mature white sharks may be tagged and that maturity is defined as being either greater than 3.5 m total length or the presence of calcified claspers.
- The permit is further amended to allow up to 3 immature White Sharks to be tagged with SPOT tags (individuals that are less than 3.5 m total length and do not have calcified claspers):
  - Although tagging juvenile sharks may lead to permanent impacts on fin development, there does not seem to be an impact on survival<sup>18</sup>.
  - While survival does not seem to be impacted, it is unknown if there are long-term impacts on fitness. In an extreme example, if the application of a SPOT tag on a smaller individual did lead to a reduction in fitness that was severe enough as to affect reproduction; this could be thought of as equating to a loss of that individual from the reproducing population (similar to a mortality).
  - The 2017 allowable harm assessment concluded that there is scope for mortality in Canadian waters without jeopardizing survival or recovery of the species. Recovery goals can likely be achieved if mortality levels remain at current levels (3 animals per decade) or increase slightly. The proportion of simulated population trajectories that declined over three generations was approximately 21% if mortality is 3 White Sharks per year.
  - Therefore, although impacts on fitness are unknown, if tagging smaller individuals did have an impact on fitness (which is not thought to be likely as extreme as causing mortality or severe impacts), by limiting the application of SPOT tags to 3 immature individuals, this would be unlikely to jeopardize survival and recovery, as any potential impacts would still fall within the allowable harm for the species.

<sup>17</sup> Jewell et al. 2011

<sup>18</sup> Jewell et al. 2011

- A similar approach is proposed for the exempting activities in the draft Recovery Strategy, where it is proposed that a maximum bycatch mortality rate of one White Shark per year averaged over any 10 year period (i.e., maximum of 10 mortalities over 10 years), is deemed acceptable. The draft Exemption Management Plan proposes that the exemption be reviewed if there are 3 mortalities/year for 2 consecutive years.
- a DFO Scientist or Observer or other representative must be onboard during a subset of the expedition, as determined by DFO;
- work will cease and DFO will be contacted immediately if there is any mortality of a White Shark or if a White Shark receives any significant injury and no further attempts at catching or tagging White Sharks will be resumed until approved by DFO;
- all interactions with White Sharks (including location of capture/tagging events; number and gender/age of all White Sharks caught and tagged) and all mitigation measures employed will be reported to DFO. In addition, unsuccessful tagging attempts, in which White Sharks were observed but not caught or tagged, will also be reported to DFO (location, length estimate, gender (if visible), weight).

☒ The activity will not jeopardize the survival or recovery of the species

Tagging of White Sharks is unlikely to jeopardize the survival or recovery of the population. The recovery goal in the draft recovery strategy is to: "Maintain or increase the population of White Sharks that frequent Atlantic Canadian waters." No mortality is expected as a result of the activities, and therefore recovery will not be compromised. Even in the very unlikely event that mortality occurs during the activities, Science advice indicates that the population of White Sharks in the NW Atlantic is increasing and current mortality levels (due to incidental capture in fisheries) would have to increase substantially before population trajectories would be predicted to decline. Therefore there is a high likelihood that recovery goals can be achieved under various scenarios of allowable harm for White Shark, even if annual bycatch mortality increases from historical estimates.<sup>19</sup>

☒ Yes ..... Go to Consultation Assessment

☐ No ..... Go to Assessment Summary

**The proposed activities are not eligible for a SARA Section 73 Permit. Go to Assessment Summary.**

### Consultation Assessment

The following two questions assess whether consultation with an outside party is required before issuing a SARA Section 73 Permit for the proposed activities:

1. **Section 73(4):** Do the proposed activities concern a species in an area in respect of which a wildlife management board is authorized by a land claims agreement to perform functions in respect of wildlife species?

☐ Yes ..... Go to Assessment Summary

☒ No ..... Go to next question

2. **Section 74(5):** Do the proposed activities concern a species in a reserve or any other lands that are set apart for the use and benefit of a band under the Indian Act?

☐ Yes ..... Go to Assessment Summary

☒ No ..... Go to Assessment Summary

### Assessment Summary

The above assessment is summarized below. In order to recommend that a SARA Section 73 Permit be issued for the proposed activities, the above assessment must demonstrate that doing so is warranted, lawful, and if applicable, that all consultation requirements of SARA s. 73(4) or 73(5) have been fulfilled.

<sup>19</sup> DFO. 2017. Evaluation of Scope for Harm for White Shark (*Carcharodon carcharias*) in Atlantic Canada. DFO Can. Sci. Adv. Sec. Sci. Resp. 2017/025.

1. The proposed activities warrant the need for a SARA Section 73 Permit.

☒ Yes ..... Go to next question

☐ No .....

**A SARA permit is not necessary. The applicant will be advised of this in writing. Go to EM Permit Decision.**

2. The proposed activities are consistent with all of the eligibility requirements of SARA Section 73.

☒ Yes ..... Go to next question

☐ No .....

**The proposed activities are not eligible for a SARA s.73 Permit. Go to EM Permit Decision.**

3. The permit decision, proposed activities, and any permit contents require consultation with an outside party.

☐ Yes .....

**Undergo consultation with the appropriate party before proceeding further in the permitting process.**

☒ No .....

**Issue a SARA s.73 Permit. Go to Ecosystem Management Permit Decision.**

#### 4. REVIEW

Input sought from:

Name	DFO Sector
Aimee Gromack	DFO Maritimes - SARMD
Heather Bowlby / Warren Joyce	DFO Maritimes - Science
Darrin Sooley	DFO Newfoundland and Labrador - SARMD

#### 5. ECOSYSTEM MANAGEMENT PERMIT DECISION

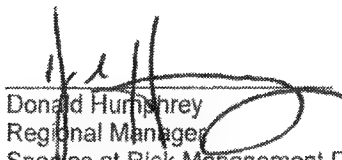
☐ A SARA Section 73 Permit is not considered necessary to engage in the proposed activities.

☒ Issue SARA Section 73 Permit subject to the conditions outlined in the SARA Section 73 Permit for DFO-MAR-2017-17.

☐ Do not issue Section 73 Permit.

#### 6. SIGN-OFF

Reviewed by:

  
Donald Humphrey  
Regional Manager  
Species at Risk Management Division (Maritimes  
Region)

OCT 02 2018

Date

## MacDonald, Jennifer

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**From:** Robert Hueter <rueter@mote.org>  
**Sent:** December-21-18 3:51 PM  
**To:** MAR SARA / LEP MAR (DFO/MPO)  
**Cc:** MacDonald, Jennifer; Gromack, Aimee; McLean, Mark G; MacDonald, Carl; Sooley, Darrin; Bowlby, Heather; Sweet, Marilyn; Humphrey, Donald; Wambolt, Michael; Maddigan, Trevor; Chris Fischer; Ami Meite; Fernanda Ubatuba; Bryan Franks; [REDACTED] Nigel Hussey; Brett McBride  
**Subject:** OCEARCH's Final Report for SARA permit 2018  
**Attachments:** OCEARCH SARA Final Report 2018.pdf  
**Importance:** High  
**Categories:** To file

Dear Fisheries and Oceans Canada personnel:

Attached is OCEARCH's Final Report for our SARA permit for white shark research in 2018. This 68-page document provides everything required by the permit, and more. I'm confident you'll agree it represents an impressive amount of work by our OCEARCH team and our 25 collaborating scientists from 18 Canadian and U.S. institutions.

We were thrilled with the success of our expedition to Nova Scotia in September-October, and even more thrilled to see the resulting science, most of which is still in the preliminary phases of analysis. We wish to thank all of the DFO personnel and the great people of Nova Scotia who helped to make our expedition a success.

We will be applying soon for a new SARA permit to return to Atlantic Canada next year. To that end, we hope to get feedback from DFO about our report as soon as possible after the holidays, so that we can answer any remaining questions and incorporate necessary information in our next permit application. We also will be scheduling a trip to Nova Scotia in early spring 2019 to meet with DFO, stakeholders and the public to discuss our 2018 results and our future plans for marine science in Canada.

Thanks again to all of you for your help with our research, and have a very Merry Christmas and a Happy New Year!

Bob

--

**ROBERT E. HUETER, Ph.D.**

*Senior Scientist & Director, Center for Shark Research  
Perry W. Gilbert Chair in Shark Research  
Manager, Sharks & Rays Conservation Research Program  
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*Chief Science Advisor, OCEARCH*

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Fax: 941-388-4312

More info at: [www.mote.org](http://www.mote.org)

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## SARA Section 73 Permit Report

### SECTION A: PERMIT INFORMATION

REPORTING YEAR:	2018	PERMIT/LICENCE#:	DFO-MAR-2017-17b
PERMIT HOLDER NAME:	ROBERT HUETER	PERMIT HOLDER ORGANIZATION:	OCEARCH
PERMIT ISSUANCE DATE:	April 30, 2018 (modified Sept. 25, 2018 and amended Oct. 1, 2018)	PERMIT EXPIRY DATE:	November 30, 2018

### SECTION B: PROJECT STATUS

PROJECT STATUS: ☒ COMPLETED ☐ CONTINUING ☐ SUSPENDED ☐ TERMINATED

PROPOSED END DATE OF PROJECT: 11/10/2018

WILL A PERMIT RENEWAL BE REQUESTED IN THE FUTURE? ☒ YES ☐ NO ☐ NOT SURE

IF YES, FOR WHAT YEAR(S)	2019-2022
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WERE ANY OF THE ACTIVITIES AUTHORIZED BY THIS PERMIT PERFORMED WITHIN THE EFFECTIVE DATES OF THE PERMIT? ☒ YES ☐ NO

IF YES, COMPLETE ALL RELEVANT SECTIONS OF THIS REPORT.

IF NO, EXPLAIN WHY, USING THE SPACE BELOW, AND GO TO SECTION G OF THIS REPORT.

N/A
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**INSTRUCTIONS: PLEASE COMPLETE SECTIONS C TO F BELOW. ADDITIONAL INFORMATION CAN BE PROVIDED IN A SEPARATE DOCUMENT USING SECTION HEADINGS CORRESPONDING TO THOSE BELOW IF NECESSARY.**

### SECTION C: REPORT OF ACTIVITIES

Describe each activity, authorized by the SARA Section 73 Permit, that was undertaken. Provide details on who performed the activity, when it took place, where it took place, what methods and equipment were used, and whether or not performing the activity resulted in an interaction with the SARA-listed species. For any activities resulting in one or more interactions with the SARA-listed species, indicate the specific Record(s) of Interaction to refer to in Section D.

See accompanying document with Additional Information
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#### SECTION D: RECORD OF INTERACTIONS

Provide all records and information pertaining to any interactions with the SARA-listed species, as specified and required by the conditions of the SARA Section 73 Permit.

See accompanying document with Additional Information

#### SECTION E: OTHER REQUIRED SUBMISSIONS

Provide any additional information or materials pertaining to the project as specified and required by the conditions of the SARA Section 73 Permit or, if none is required, check the box below:

☐ THE SUBMISSION OF OTHER INFORMATION OR MATERIALS IS NOT REQUIRED BY THE TERMS OF THE PERMIT

See accompanying document with Additional Information

#### SECTION F: OPTIONAL SUBMISSIONS

Provide any additional information or materials to share with Fisheries and Oceans Canada pertaining to your work or the SARA Section 73 Permit. This may include any additional information or findings, future plans with respect to work involving or affecting SARA-listed species, any challenges the conditions of the permit presented in completing the planned activities and/or any suggestions for additional or alternative measures that could be taken in the future to minimize the impact of the activity on the species. If no information will be provided, check the box below:

☐ I HAVE NO ADDITIONAL INFORMATION OR MATERIALS THAT I WISH TO SUBMIT

See accompanying documents with Additional Information

#### SECTION G: SUBMIT COMPLETED REPORT

SUBMIT YOUR COMPLETED REPORT AND ALL REQUIRED ATTACHMENTS ANNUALLY ON OR BEFORE THE DATE STIPULATED IN YOUR PERMIT.

**BY MAIL:** Fisheries and Oceans Canada  
Species at Risk Management Division  
PO Box 1006, Station P500  
Dartmouth, Nova Scotia B2Y 4A2  
Canada

**BY EMAIL:** [SpeciesatRisk.xmar@dfo-mpo.gc.ca](mailto:SpeciesatRisk.xmar@dfo-mpo.gc.ca)

**BY FAX:** 902-426-2331

REPORT COMPLETED BY (*Print Name*): ROBERT E HUETER

SIGNATURE: 

DATE COMPLETED: 21/12/2018

## SECTION H: PRIVACY NOTICE STATEMENT

The information you provide in relation to this form is collected under the authority of the *Species at Risk Act* for the purpose of permit reporting. The information may be used for evaluation and compliance. You have the right to the correction of, access to, and protection of, your personal information under the *Privacy Act* and to file a complaint with the Privacy Commissioner of Canada over Fisheries and Oceans Canada's handling of your information. Personal information collected through the permitting process is described in the Personal Information Bank number DFO PPU 770 and can be accessed and assessed for accuracy. For more information, visit [http://www.inter.dfo-mpo.gc.ca/atip/infosource\\_e/pib-e/Species\\_at\\_Risk\\_Act\\_Permit-e](http://www.inter.dfo-mpo.gc.ca/atip/infosource_e/pib-e/Species_at_Risk_Act_Permit-e). Info Source is a series of publications containing information about and/or collected by the Government of Canada.

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## **SARA Section 73 Permit Report**

**OCEARCH**

**December 21, 2018**

### **ADDITIONAL INFORMATION**

#### **SECTION C: REPORT OF ACTIVITIES**

OCEARCH, a nonprofit research and education organization based in the U.S., is engaged in a multi-year comprehensive study of the biology and status of the white shark (*Carcharodon carcharias*) in the North Atlantic Ocean. In 2018, OCEARCH extended these studies for the first time to Atlantic Canada waters. Field activities for OCEARCH's Nova Scotia Expedition were conducted from September 20, 2018 to October 9, 2018. The expedition was staged out of the port of Lunenburg, NS. Approximately 15 days of fishing and sampling were accomplished, with the other days anchored inside or at the dock due to weather that prevented safe working conditions.

After exploratory attempts to discover white sharks east of Lunenburg in the vicinity of Cross Island and Little Duck Island, where one white shark was sighted (see Section D, below), the OCEARCH ship was moved farther south to the area inside West Ironbound Island. It was here that all seven captured white sharks were found and three out of four sighted but non-captured sharks were seen. This area proved so productive that it was decided to concentrate our activities for the remainder of the expedition in this location.

All conditions of the SARA permit were followed. The fishing team used a combination of set lines and rod-and-reel to target white sharks in the vicinity, as described in the permit. Techniques prevented sharks from swallowing the hook and bait; all sharks were hooked in the corner of the jaw, and all hooks were retrieved from the captured sharks along with the bait onboard the OCEARCH research platform. The fishing team consisted of OCEARCH Capt. Brett McBride, OCEARCH Founder Chris Fischer, and the OCEARCH fishing crew working out of OCEARCH's 28 ft Contender fishing boat.

Limited chumming was conducted from the Contender and OCEARCH vessels as per our permit conditions. A small decoy resembling a seal also was trailed behind the OCEARCH vessel to visually attract white sharks in the area. After concerns were raised by DFO about fishing activities within visual range of Hirtles Beach, NS, our permit was modified requiring us to move the ship farther south of West Ironbound Island, while the fishing activities continued at the site where white sharks had been found. Chumming was discontinued within 2 nm of Hirtles Beach, as requested by DFO. However, DFO agents onboard the ship determined that it was detrimental to the sharks to transport them the farther distance from the capture site to where the ship was anchored, and thus our permit was amended again, allowing the ship to return to West Ironbound Island, close to the fishing activities. Chumming was deemed not necessary at that point as the sharks were being captured in sufficient numbers.



Only white sharks were captured and transported to the ship's research platform; no other sharks were observed during the expedition. The Contender slowly towed captured sharks to the platform, using a handline with buoys to keep the shark in a normal swimming posture near the surface. The hydraulic platform was submerged allowing the shark to swim into position for study. The platform was then raised and a seawater hose was placed inside the shark's mouth to continuously irrigate the gills. A wet terrycloth towel was placed over the shark's head covering the eyes and gill slits, and buckets of cool seawater were intermittently poured over the shark to keep its surfaces wet. A tail rope was applied around the shark's caudal peduncle to guard against sudden movement, but generally the sharks did not move once on the lift and remained calm and placid during the entire science procedure. Expedition Veterinarian Dr. Alisa Newton and Expedition Chief Scientist Dr. Robert Hueter monitored the shark's condition and coloration throughout the procedure.

The following comprised the Science Team working on each shark on the platform; two were onboard for the entire expedition, the rest were on for only part of the expedition:

- Robert Hueter, Mote Marine Laboratory – Expedition Chief Scientist (entire expedition)
- [REDACTED] Wildlife Conservation Society/New York Aquarium – Expedition Veterinarian (entire expedition)
- Bryan Franks, Jacksonville University
- Trevor Maddigan, DFO (St. John's, Newfoundland)
- Maeva Giraudo, Environment and Climate Change Canada
- Nigel Hussey, University of Windsor, Ontario
- [REDACTED] Mote Marine Laboratory (Canadian scientist based in Toronto)
- [REDACTED] SeaWorld
- [REDACTED] Stony Brook University
- [REDACTED] University of North Florida
- [REDACTED] Jacksonville University

Sharks were examined, measured, sampled and tagged on the platform using a two-stage process: Stage I had the shark lying on its left side so the abdomen could be accessed; Stage II was with the shark lying upright on its abdomen. The platform was lowered slightly into the water as necessary to shift the shark's position between stages, but in most cases the shark could be rolled without having to lower the platform. The following research procedures were conducted on the sharks on the platform:

- Length and girth measurements
- Blood draws (two, at start of exam and at end just prior to release)
- Acoustic tag internal implantation in coelomic cavity followed by suturing of incision
- Muscle tissue biopsy followed by suturing of incision as necessary
- Clasper length measurements (if male)
- Semen sampling (if male)
- Ultrasound exam of abdomen (if female; but see below)
- Ectoparasite collection
- Fin clip for DNA
- Fecal sample for DNA
- Microbiological swab samples of skin surfaces
- Attachment of SPOT tag (n=6)
- Attachment of PSAT tag (n=2) followed by suturing of incision as necessary
- Photographs of shark, characteristic markings, and eye

Not all procedures were conducted on every shark, e.g., unfortunately our ultrasound machine that had been onboard in the first part of the expedition was not onboard when we captured the two females in the latter part of the expedition, so we could not examine them for pregnancy. (The one female of mature size, Luna [NS2018-07], did not appear outwardly to be pregnant.) The Expedition Chief Scientist recorded all data on a waterproof form and kept a stopwatch noting key times in the procedures, ensuring that sharks were released by around the 20-minute mark on the platform. At that point the science team came off the platform and it was lowered into the water, allowing the shark to begin swimming on its own. Once the shark showed signs of it being ready to leave, the seawater hose was removed and the shark swam off. In a couple of instances, sharks that were hesitant to swim away from the platform were attached to a light monofilament used to guide them off and get them swimming. Once they were swimming on their own, the monofilament was removed. This is a standard procedure used by the OCEARCH team.

All SPOT-tagged sharks began transmitting locations within a few days to two weeks' time, typical of this species, demonstrating that all had tolerated the procedures well and were continuing with their movements around Nova Scotia (see *Optional Submissions documents*). The only shark not receiving a SPOT tag was "Shorty" (NS2018-04), due to DFO restrictions for minimum size/maturity of sharks for fin-mounted tags—restrictions that were later amended by DFO to allow for up to three subadults to be SPOT-tagged. Our first shark captured and sampled, Nova (NS2018-01), was originally judged to be sexually mature based on the fact that his claspers were rigid and calcifying, and therefore a SPOT tag was applied to him even though he measured less than 3.5mTL. However, after later discussion by the science team, and examining his clasper measurements, videos and photos and comparing them to other mature males, the team reconsidered whether Nova's claspers were fully developed and functional. To be conservative and not call an immature male mature, thus possibly wrongly influencing the literature on size-at-maturity for the species, the team reclassified Nova as a nearly mature subadult. The metadata provided in this report reflects that change.

In all, more than 300 individual samples were collected from the seven sharks and the needs of 16 research projects led by 25 principal investigators from 18 Canadian and U.S. institutions were served (see *Optional Submissions documents*). Three adult and three subadult sharks received five-year SPOT tags and two subadults (one male, one female) were double-tagged with one-year PSAT tags. All were implanted with ~10-year internal acoustic tags except for Jefferson (NS2018-02), which carried an external acoustic tag previously attached by another research team in Massachusetts (see Section D, below).

## SECTION D: RECORD OF INTERACTIONS

A total of 11 interactions with white sharks were documented during the expedition. Four of these were sightings without capture, as follows:

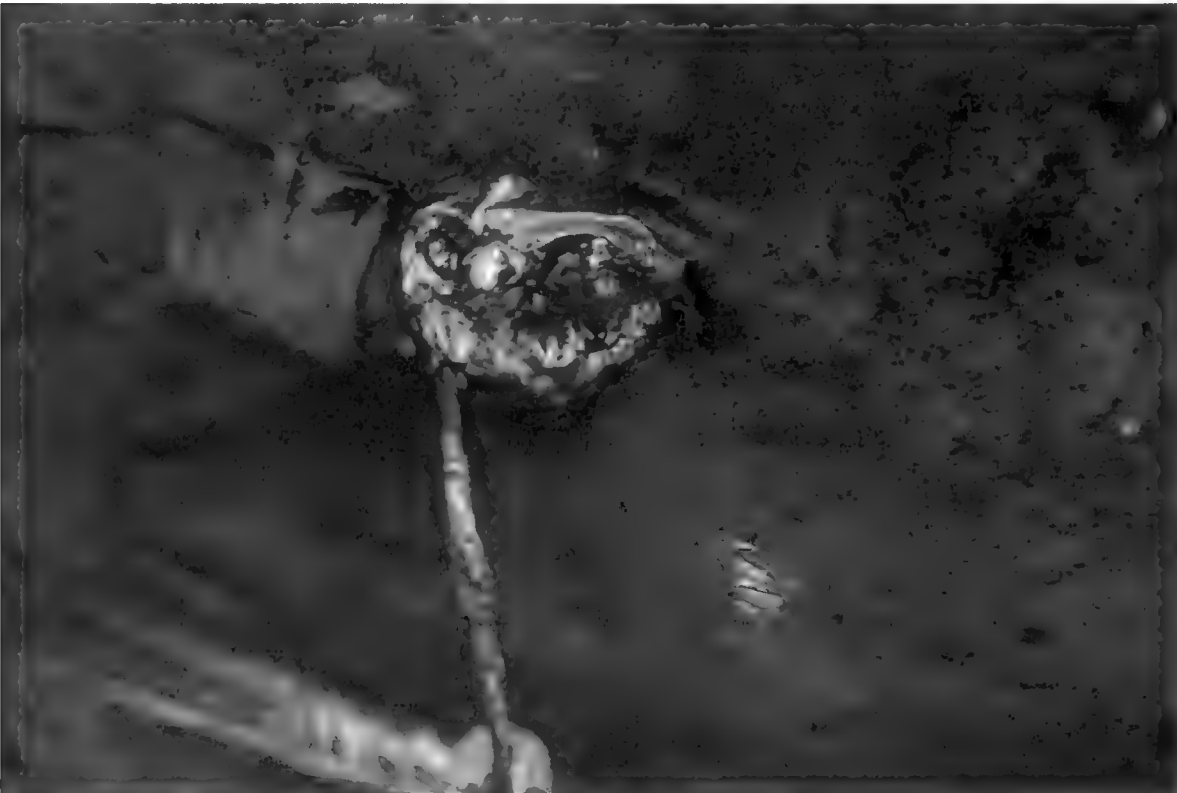
- Near Little Duck Island 23 Sep 2018, 1054: White shark fin sighting near ship. Could not judge size, appeared large. Sex unknown. Shark appeared briefly then was not seen again.
- Near West Ironbound Island 30 Sep 2018, 1315: White shark, possibly ~3.0mTL male, briefly mouthed bait near stern of research ship. Not caught and not seen again. Possible this shark was "Shorty" (NS2018-04) caught about two hours later in the area, but this is speculation.
- Near West Ironbound Island 8 Oct 2018, 1130: Shark took set line, large animal. When fishing crew tried to bring shark under control for transport to research ship, shark fought and tip of hook broke off, setting the shark free. Shark not seen, but likely a white shark. No size or sex information. Possibly Luna (NS2018-07) caught about six hours later in the area, but this is speculation.
- Near West Ironbound Island 8 Oct 2018, 1643: Shark was seen grabbing bait on a set line and breaking the surface, but it threw the hook and was not captured. No estimate of size or sex. Possibly also Luna, who was caught about 1.5 hrs later in the area, but this also is speculation.

The other seven interactions were with white sharks that were captured, brought to the research ship, sampled and tagged, and released. See "Data List from 7 White Sharks Sampled by OCEARCH in Nova Scotia 2018" in Optional Submissions documents; this spreadsheet provides the complete metadata for these seven sharks. All were captured near West Ironbound Island in the same location.

One of these sharks, Jefferson (NS2018-02), a mature male, was notable for carrying an external Vemco acoustic tag that had been attached by another researcher, not OCEARCH. When this shark came on the platform, the team noted the tag attached at the shark's right dorsal surface below the first dorsal fin. There was considerable biofouling on the tag case (see photo below, top), but a thumb scrape allowed us to read the tag ID (21291) and serial number (1221132). Other than the thumb scrape, the tag was not disturbed in any way and was left on the shark. We chose to not implant this shark with our own internal acoustic tag, due to concerns of the potential for signal collisions between two acoustic tags on the same shark. (A member of Vemco's R&D team later informed us that tag signal collision frequency would have been minimal with a double-tagged animal.) This tag was later determined to have been deployed about three years prior by G. Skomal of the Massachusetts Division of Marine Fisheries, who was notified. We have received no response from this researcher but assume it was deployed in waters near Cape Cod, Mass. The area around this tag's anchor entry point was still open, aggravated and not healing well (see photo below, bottom), three years after deployment. The researcher who deployed this tag uses a harpooning method from a moving boat that does not allow precise placement of tag anchors or suturing of the wound after tagging, contrary to the methods used on OCEARCH. During our permit application process, DFO asked us for details contrasting OCEARCH's platform method with the non-capture harpooning method for studying large sharks in the wild (see Optional Submissions documents). In contrast to the harpooning approach, OCEARCH's method uses aseptic treatment of external tag anchors and tethers before attachment, precise positioning of the tag anchor in the musculature, and suturing of the wound as needed by our onboard veterinarian. This helps to minimize post-tagging infection and maximize healing. Although Jefferson appeared to be relatively robust, the unhealed wound around his external acoustic tag is no doubt detrimental to the health of this shark.



Photos of Jefferson's external acoustic tag applied three years earlier by Massachusetts DMF, showing biofouling on tag (above) and unhealed, aggravated wound around tag tether (below). OCEARCH did not remove the tag but reported it to Massachusetts DMF.



## SECTION E: OTHER REQUIRED SUBMISSIONS

### Conditions that relate to monitoring and reporting as per OCEARCH SARA permit

#### **1. Demonstration that measures and standards to avoid and mitigate the impacts of the permitted activities on the species were implemented according to the conditions of this permit:**

The SARA permit conditions were followed. As previously stated, the permit was amended twice so these conditions changed somewhat during the expedition. Daily communications with DFO in Halifax ensured that conditions were understood and as many as three DFO staff members were onboard the ship for much of the expedition to observe our methods and permit compliance. The one permit condition that proved difficult to adhere to was the requirement to limit total time of engagement, from hook-up to release, to 40 minutes (SARA permit condition 2.12). We did not have this number in our permit application and that limit is not tenable when handling white sharks of the size found during the expedition. With a 20-minute time on the platform, this would require sharks to be hooked, controlled and transported from fishing spot to the ship within a maximum of 20 minutes. That number might represent an average time of handling in certain cases, but to get the Nova Scotia animals to the ship within 20 minutes would have required forceful towing of some sharks before they were ready, which would be detrimental to the animals. It is preferable and less stressful on the sharks to allow them to swim their way to the ship with the guidance of the fishing boat, a process that may at times take more than 20 minutes to accomplish. The 40-minute total engagement limit in our SARA permit may have been the result of a miscommunication on our part about our methodology. In the future, therefore, we will be clearer in our SARA permit applications about the total required time of engagement.

#### **2. Assessment of whether the measures and standards mentioned in condition 3.1.1 were successful at avoiding and mitigating the impacts of the permitted activities on the species:**

SPOT tag tracks on OCEARCH's Tracker ([www.ocearch.org](http://www.ocearch.org)) show clearly that the seven white sharks tolerated the research activities well and resumed normal behavior after release. During handling of captured sharks on the platform, we were able to monitor blood gas and metabolic changes associated with the secondary stress response to handling. These tests showed that some stress indicators either remained level or decreased during the 20 minutes on the platform (see Expedition Project VIII, see pp 31-35 in Preliminary Science Reports in Optional Submissions documents). The animals did not struggle while on the platform, reducing the effects of capture stress that can be a greater problem if the shark is freely thrashing alongside a boat in the water, where supplemental ventilation may not be possible. Highlights of the white shark stress response during OCEARCH capture, sampling and tagging are:

- White sharks demonstrate a secondary stress response to capture similar to what has been published for other elasmobranch species, including other endothermic species.
- Blood gas and metabolic changes seen during handling on the platform demonstrate the animals are well-ventilated during the procedure and they perform appropriate metabolic compensation, with stable-to-improving blood gas and metabolic changes.



- We have detected a unique change in 50% of the animals that we handle where certain secondary stress response indicators, specifically lactate levels, show an unexpected improvement during the time they are handled. Lactate levels are expected to increase in the first hours after a capture event. Recently it has been proposed that endothermic elasmobranchs are able to more quickly physiologically shift from anaerobic metabolism to aerobic metabolism. The lactate decrease we see in handled white sharks may indicate that these animals are starting their natural recovery process during handling, which may be in part due to adequate ventilation on the OCEARCH platform.

**3. Details of any contingency measures that were followed to prevent impacts greater than those authorized by this permit:**

No contingency measures were required.

**4. For any interaction with, or sighting of, a White Shark, report the following: date, time, location, length, size, gender (specify if females are pregnant or not), condition of the individual; and identify if tagging was attempted or undertaken on that individual:**

Provided in Section D and in "Data List from 7 White Sharks Sampled by OCEARCH in Nova Scotia 2018" in Optional Submissions documents.

**5. For any sexually mature White Shark less than 3.5 m that is SPOT tagged, provide photographic evidence that is date and location stamped showing clasper calcification:**

Because Nova (3.41mTL) was reclassified as a subadult, all sexually mature males (Jefferson 3.86mTL and Hal 3.90mTL) that we tagged were longer than 3.5m. (Nova's claspers can be seen in the photo on page 10 of the Preliminary Science Reports in the Optional Submissions documents.)

**6. Details of any tagging attempts, including whether tagging was successful, unplanned or unexpected impacts on the shark, reaction of the shark to the tagging, and lessons learned:**

Previously described and detailed in Optional Submissions documents.

## **SECTION F: OPTIONAL SUBMISSIONS**

**Documents following:**

- **Data List from 7 White Sharks Sampled by OCEARCH in Nova Scotia 2018**
- **OCEARCH Nova Scotia, Biological Sample Manifest**
- **OCEARCH Nova Scotia Preliminary Science Reports Dec 2018**
- **Comparison Between OCEARCH Platform Method and Non-Capture Harpooning Method for Studies of Large Sharks in the Wild**
- **OCEARCH Public Outreach for Nova Scotia Expedition 2018**

## DATA LIST FROM 7 WHITE SHARKS SAMPLED BY OCEARCH IN NOVA SCOTIA 2018

Common name	Scientific name	Sample ID	Name	Date	Sex	Maturity	SPOT PTT/SN	SPOT Type	PSAT PTT/SN	Tether Type	Acoustic ID/SN	# Sutures
White shark	<i>Carcharodon carcharias</i>	NS2018-01	Nova	9/24/2018	M	Subadult*	175001/17U2202	Fin mount	34347/16P2126	Dart	14279/126853	3 interrupted
White shark	<i>Carcharodon carcharias</i>	NS2018-02	Jefferson	9/24/2018	M	Mature	175002/17U2203	Fin mount	None	N/A	21291/1221132**	N/A
White shark	<i>Carcharodon carcharias</i>	NS2018-03	Hal	9/29/2018	M	Mature	175003/17U2204	Fin mount	None	N/A	14277/1268651	3 interrupted
White shark	<i>Carcharodon carcharias</i>	NS2018-04	Shorty	9/30/2018	M	Subadult	None due to DFO size limit	N/A	None	N/A	11875/1281130	3 interrupted
White shark	<i>Carcharodon carcharias</i>	NS2018-05	Cabot	10/5/2018	M	Subadult	170022/16U2776	Fin mount	None	N/A	11873/1281128	3 interrupted
White shark	<i>Carcharodon carcharias</i>	NS2018-06	Jane	10/8/2018	F	Subadult	173764/17U2192	Fin mount	34348/16P2127	Dart	11871/1281126	3 interrupted
White shark	<i>Carcharodon carcharias</i>	NS2018-07	Luna	10/8/2018	F	Mature	173770/17U2198	Fin mount	None	N/A	11869/1281124	4 interrupted

\*Originally categorized as Mature, after review changed to Subadult

\*\*3 yr-old external tag previously attached by Massachusetts DMF

Hooked (time)	Time on cradle (min)	Blood 1	Acoustic start	Acoustic end	Blood 2	Release	PCL (cm)	FL (cm)	STL (cm)	TL (cm)	Est Weight (kg)	Girth (cm)	Clasper length: inner (cm)	Clasper length: outer (cm)
12:12	21	13:08	13:08	13:17	13:25	13:44	285	319	N/A	341	401	213	38.2	35.5
18:34	33	19:18	N/A	N/A	19:30	19:35	323	365	N/A	386	608	250	48	41
12:50	32	13:58	13:57	14:02	14:09	14:25	315	352	400	390	543	230	66	42.5
15:59	13	16:32	16:27	16:32	16:38	16:41	278	308	344	325	360	186	42	26
14:47	14	15:19	15:17	15:20	15:28	15:40	231	260	296	274	213	164	44	29
13:26	18	13:49	13:48	13:55	14:01	14:05	239	269	305	286	237	155	N/A	N/A
18:25	22	19:18	19:12	19:19	19:29	19:32	350	399	458	425	800	265	N/A	N/A

Blood collector	Time btw bloods (min)	Microbiome	Fin clip	Muscle	Parasites	Feces	Semen	Calcified claspers?	Location	Weight (kg)	Length (cm)	Depth (m)	Direction	Temperature (°C)	Notes
HN	17	Yes	Yes	Yes	Yes	Not successful	Not successful	Yes	West Ironbound I.	N 44 13.670	W 64 17.081	10 kt NE	65	61.2	Sunny, cool
HN	14	Yes	Yes	Yes	Yes	Not successful	Not successful	Yes	West Ironbound I.	N 44 13.670	W 64 17.081	5 kt NE	65	61.2	Clear, cool
HN	11	Yes	Yes	Yes	Yes	Not successful	Yes	Yes	West Ironbound I.	N 44 13.670	W 64 17.081	6 kt N	65	60.5	Clear, cool
HN	6	Yes	Yes	Yes	Yes	Not attempted	Not attempted	No	West Ironbound I.	N 44 13.670	W 64 17.081	5 kt N	65	60.5	Mostly sunny, cool
HN	9	Yes	Yes	Yes	Yes	Yes	Not attempted	No	West Ironbound I.	N 44 13.670	W 64 17.081	5 kt N	65	60.3	Mostly sunny, cool
HN	12	Yes	Yes	Yes	Yes	Yes	N/A	N/A	West Ironbound I.	N 44 13.670	W 64 17.081	5 kt N	65	60.5	Sunny
HN	11	Yes	Yes	Yes	Yes	Not attempted	N/A	N/A	West Ironbound I.	N 44 13.670	W 64 17.081	Calm	65	59.5	Sunny

Release behavior	Release coloration	Release condition	Release method	Notes
Slow to get off lift, towed briefly	Good; some red on abdomen	Good	Drumline	Foul-hooked right pec, hook transferred to mouth
Good, alert	Good; some red on abdomen	Good	Drumline	Right corner
Towed briefly	Very good	Good	Drumline	Right side of mouth
Excellent, swam off immediately	Very good	Very good	Drumline	Left corner of mouth
Towed briefly	Good; some red on abdomen	Fair	Drumline	Right corner
Very good, swam off immediately	Good	Good	Drumline	Right corner
Very good, swam off immediately	Good	Good	Hook & line	Right corner

**OCEARCH NOVA SCOTIA, BIOLOGICAL SAMPLE MANIFEST – 301 TOTAL SAMPLES COLLECTED**

<b>SPECIES</b>	<b>SPECIMEN</b>	<b>SAMPLE ID</b>	<b>LOCATION</b>	
Carcharodon carcharias	Whole blood, frozen	NS2018-01	Braun, slot 1	
Carcharodon carcharias	Whole blood, frozen	NS2018-02	Braun, slot 2	
Carcharodon carcharias	Whole blood, frozen	NS2018-03	Braun, slot 3	
Carcharodon carcharias	Whole blood, frozen	NS2018-05	Braun, slot 4	
Carcharodon carcharias	Whole blood, frozen	NS2018-06	Braun, slot 5	
Carcharodon carcharias	Whole blood, frozen	NS2018-07	Braun, slot 6	
		<b>TOTAL</b>	<b>6</b>	<b>1.0 ml cryovials</b>
<b>SPECIES</b>	<b>SPECIMEN</b>	<b>SAMPLE ID</b>	<b>LOCATION</b>	
Carcharodon carcharias	Whole blood, formalin	NS2018-01 #1	Newton, slot 1	
Carcharodon carcharias	Whole blood, formalin	NS2018-01 #2	Newton, slot 2	
Carcharodon carcharias	Whole blood, formalin	NS2018-02 #1	Newton, slot 3	
Carcharodon carcharias	Whole blood, formalin	NS2018-02 #2	Newton, slot 4	
Carcharodon carcharias	Whole blood, formalin	NS2018-04 #1	Newton, slot 5	
Carcharodon carcharias	Whole blood, formalin	NS2018-04 #2	Newton, slot 6	
Carcharodon carcharias	Whole blood, formalin	NS2018-05 #1	Newton, slot 7	
Carcharodon carcharias	Whole blood, formalin	NS2018-05 #2	Newton, slot 8	
Carcharodon carcharias	Whole blood, formalin	NS2018-06 #1	Newton, slot 9	
Carcharodon carcharias	Whole blood, formalin	NS2018-06 #2	Newton, slot 10	
Carcharodon carcharias	Whole blood, formalin	NS2018-07 #1	Newton, slot 11	
Carcharodon carcharias	Whole blood, formalin	NS2018-07 #2	Newton, slot 12	
		<b>TOTAL</b>	<b>12</b>	<b>0.5 ml vials</b>
<b>SPECIES</b>	<b>SPECIMEN</b>	<b>SAMPLE ID</b>	<b>LOCATION</b>	
Carcharodon carcharias	Plasma, frozen	NS2018-01	Hoopes, slot 1	
Carcharodon carcharias	Plasma, frozen	NS2018-01	Hoopes, slot 2	
Carcharodon carcharias	Plasma, frozen	NS2018-02	Hoopes, slot 3	
Carcharodon carcharias	Plasma, frozen	NS2018-02	Hoopes, slot 4	
Carcharodon carcharias	Plasma, frozen	NS2018-03	Hoopes, slot 5	
Carcharodon carcharias	Plasma, frozen	NS2018-03	Hoopes, slot 6	
Carcharodon carcharias	Plasma, frozen	NS2018-04	Hoopes, slot 7	
Carcharodon carcharias	Plasma, frozen	NS2018-04	Hoopes, slot 8	
Carcharodon carcharias	Plasma, frozen	NS2018-05	Hoopes, slot 9	
Carcharodon carcharias	Plasma, frozen	NS2018-05	Hoopes, slot 10	
Carcharodon carcharias	Plasma, frozen	NS2018-06	Hoopes, slot 11	
Carcharodon carcharias	Plasma, frozen	NS2018-06	Hoopes, slot 12	
Carcharodon carcharias	Plasma, frozen	NS2018-07	Hoopes, slot 13	
Carcharodon carcharias	Plasma, frozen	NS2018-07	Hoopes, slot 14	
Carcharodon carcharias	Plasma, frozen	NS2018-01	Gelsleichter, slot 1	
Carcharodon carcharias	Plasma, frozen	NS2018-02	Gelsleichter, slot 2	
Carcharodon carcharias	Plasma, frozen	NS2018-03	Gelsleichter, slot 3	
Carcharodon carcharias	Plasma, frozen	NS2018-04	Gelsleichter, slot 4	
Carcharodon carcharias	Plasma, frozen	NS2018-05	Gelsleichter, slot 5	
Carcharodon carcharias	Plasma, frozen	NS2018-06	Gelsleichter, slot 6	
Carcharodon carcharias	Plasma, frozen	NS2018-07	Gelsleichter, slot 7	

Carcharodon carcharias	Plasma, frozen	NS2018-01	Stewart, slot 8	
Carcharodon carcharias	Plasma, frozen	NS2018-02	Stewart, slot 18	
Carcharodon carcharias	Plasma, frozen	NS2018-03	Stewart, slot 28	
Carcharodon carcharias	Plasma, frozen	NS2018-04	Stewart, slot 38	
Carcharodon carcharias	Plasma, frozen	NS2018-05	Stewart, slot 48	
Carcharodon carcharias	Plasma, frozen	NS2018-06	Stewart, slot 58	
Carcharodon carcharias	Plasma, frozen	NS2018-07	Stewart, slot 68	
Carcharodon carcharias	Plasma, frozen	NS2018-01 #1	Newton, slot 1	
Carcharodon carcharias	Plasma, frozen	NS2018-01 #2	Newton, slot 2	
Carcharodon carcharias	Plasma, frozen	NS2018-02 #1	Newton, slot 3	
Carcharodon carcharias	Plasma, frozen	NS2018-02 #2	Newton, slot 4	
Carcharodon carcharias	Plasma, frozen	NS2018-03 #1	Newton, slot 5	
Carcharodon carcharias	Plasma, frozen	NS2018-03 #2	Newton, slot 6	
Carcharodon carcharias	Plasma, frozen	NS2018-04 #1	Newton, slot 7	
Carcharodon carcharias	Plasma, frozen	NS2018-04 #2	Newton, slot 8	
Carcharodon carcharias	Plasma, frozen	NS2018-05 #1	Newton, slot 9	
Carcharodon carcharias	Plasma, frozen	NS2018-05 #2	Newton, slot 10	
Carcharodon carcharias	Plasma, frozen	NS2018-06 #1	Newton, slot 11	
Carcharodon carcharias	Plasma, frozen	NS2018-06 #2	Newton, slot 12	
Carcharodon carcharias	Plasma, frozen	NS2018-07 #1	Newton, slot 13	
Carcharodon carcharias	Plasma, frozen	NS2018-07 #2	Newton, slot 14	
Carcharodon carcharias	Plasma, frozen	NS2018-01	Archive	
Carcharodon carcharias	Plasma, frozen	NS2018-02	Archive	
Carcharodon carcharias	Plasma, frozen	NS2018-02	Archive	
Carcharodon carcharias	Plasma, frozen	NS2018-02	Archive	
Carcharodon carcharias	Plasma, frozen	NS2018-02	Archive	
Carcharodon carcharias	Plasma, frozen	NS2018-02	Archive	
Carcharodon carcharias	Plasma, frozen	NS2018-02	Archive	
Carcharodon carcharias	Plasma, frozen	NS2018-03	Archive	
Carcharodon carcharias	Plasma, frozen	NS2018-03	Archive	
Carcharodon carcharias	Plasma, frozen	NS2018-03	Archive	
Carcharodon carcharias	Plasma, frozen	NS2018-03	Archive	
Carcharodon carcharias	Plasma, frozen	NS2018-03	Archive	
Carcharodon carcharias	Plasma, frozen	NS2018-03	Archive	
Carcharodon carcharias	Plasma, frozen	NS2018-04	Archive	
Carcharodon carcharias	Plasma, frozen	NS2018-05	Archive	
Carcharodon carcharias	Plasma, frozen	NS2018-05	Archive	
Carcharodon carcharias	Plasma, frozen	NS2018-07	Archive	
		<b>TOTAL</b>		<b>59 1.5 ml cryovials</b>
<b>SPECIES</b>	<b>SPECIMEN</b>	<b>SAMPLE ID</b>	<b>LOCATION</b>	
Carcharodon carcharias	Serum	Not collected		

SPECIES	SPECIMEN	SAMPLE ID	LOCATION	
Carcharodon carcharias	Packed red blood cells, fro	NS2018-01	Archive	
Carcharodon carcharias	Packed red blood cells, fro	NS2018-01	Archive	
Carcharodon carcharias	Packed red blood cells, fro	NS2018-02	Archive	
Carcharodon carcharias	Packed red blood cells, fro	NS2018-02	Archive	
Carcharodon carcharias	Packed red blood cells, fro	NS2018-03	Archive	
Carcharodon carcharias	Packed red blood cells, fro	NS2018-03	Archive	
Carcharodon carcharias	Packed red blood cells, fro	NS2018-03	Archive	
Carcharodon carcharias	Packed red blood cells, fro	NS2018-04	Archive	
Carcharodon carcharias	Packed red blood cells, fro	NS2018-04	Archive	
Carcharodon carcharias	Packed red blood cells, fro	NS2018-05	Archive	
Carcharodon carcharias	Packed red blood cells, fro	NS2018-06	Archive	
Carcharodon carcharias	Packed red blood cells, fro	NS2018-06	Archive	
Carcharodon carcharias	Packed red blood cells, fro	NS2018-07	Archive	
		<b>TOTAL</b>	<b>13</b>	<b>1.8 ml cryovials</b>
SPECIES	SPECIMEN	SAMPLE ID	LOCATION	
Carcharodon carcharias	Muscle, frozen	NS2018-01	Braun, slot 16	
Carcharodon carcharias	Muscle, frozen	NS2018-02	Braun, slot 17	
Carcharodon carcharias	Muscle, frozen	NS2018-03	Braun, slot 18	
Carcharodon carcharias	Muscle, frozen	NS2018-04	Braun, slot 19	
Carcharodon carcharias	Muscle, frozen	NS2018-05	Braun, slot 20	
Carcharodon carcharias	Muscle, frozen	NS2018-06	Braun, slot 21	
Carcharodon carcharias	Muscle, frozen	NS2018-07	Braun, slot 22	
Carcharodon carcharias	Muscle, frozen	NS2018-01	Naylor slot 1	
Carcharodon carcharias	Muscle, frozen	NS2018-02	Naylor slot 2	
Carcharodon carcharias	Muscle, frozen	NS2018-03	Naylor slot 3	
Carcharodon carcharias	Muscle, frozen	NS2018-04	Naylor slot 4	
Carcharodon carcharias	Muscle, frozen	NS2018-05	Naylor slot 5	
Carcharodon carcharias	Muscle, frozen	NS2018-06	Naylor slot 6	
Carcharodon carcharias	Muscle, frozen	NS2018-07	Naylor slot 7	
Carcharodon carcharias	Muscle, frozen	NS2018-01	Crawford, slot 1	
Carcharodon carcharias	Muscle, frozen	NS2018-01	Crawford, slot 2	
Carcharodon carcharias	Muscle, frozen	NS2018-01	Crawford, slot 3	
Carcharodon carcharias	Muscle, frozen	NS2018-01	Crawford, slot 4	
Carcharodon carcharias	Muscle, frozen	NS2018-02	Crawford, slot 5	
Carcharodon carcharias	Muscle, frozen	NS2018-02	Crawford, slot 6	
Carcharodon carcharias	Muscle, frozen	NS2018-02	Crawford, slot 7	
Carcharodon carcharias	Muscle, frozen	NS2018-02	Crawford, slot 8	
Carcharodon carcharias	Muscle, frozen	NS2018-03	Crawford, slot 9	
Carcharodon carcharias	Muscle, frozen	NS2018-03	Crawford, slot 10	
Carcharodon carcharias	Muscle, frozen	NS2018-03	Crawford, slot 11	
Carcharodon carcharias	Muscle, frozen	NS2018-03	Crawford, slot 12	
Carcharodon carcharias	Muscle, frozen	NS2018-04	Crawford, slot 213	
Carcharodon carcharias	Muscle, frozen	NS2018-04	Crawford, slot 14	
Carcharodon carcharias	Muscle, frozen	NS2018-04	Crawford, slot 15	

Carcharodon carcharias	Muscle, frozen	NS2018-04	Crawford, slot 16	
Carcharodon carcharias	Muscle, frozen	NS2018-05	Crawford, slot 17	
Carcharodon carcharias	Muscle, frozen	NS2018-05	Crawford, slot 18	
Carcharodon carcharias	Muscle, frozen	NS2018-05	Crawford, slot 19	
Carcharodon carcharias	Muscle, frozen	NS2018-05	Crawford, slot 20	
Carcharodon carcharias	Muscle, frozen	NS2018-06	Crawford, slot 21	
Carcharodon carcharias	Muscle, frozen	NS2018-06	Crawford, slot 22	
Carcharodon carcharias	Muscle, frozen	NS2018-06	Crawford, slot 23	
Carcharodon carcharias	Muscle, frozen	NS2018-06	Crawford, slot 24	
Carcharodon carcharias	Muscle, frozen	NS2018-07	Crawford, slot 25	
Carcharodon carcharias	Muscle, frozen	NS2018-07	Crawford, slot 26	
Carcharodon carcharias	Muscle, frozen	NS2018-07	Crawford, slot 27	
		<b>TOTAL</b>	<b>41</b>	<b>1.8 ml cryovials</b>
<b>SPECIES</b>	<b>SPECIMEN</b>	<b>SAMPLE ID</b>	<b>LOCATION</b>	
Carcharodon carcharias	Fin clip, frozen	NS2018-01	Archive	
Carcharodon carcharias	Fin clip, frozen	NS2018-02	Archive	
Carcharodon carcharias	Fin clip, frozen	NS2018-03	Archive	
Carcharodon carcharias	Fin clip, frozen	NS2018-04	Archive	
Carcharodon carcharias	Fin clip, frozen	NS2018-05	Archive	
Carcharodon carcharias	Fin clip, frozen	NS2018-06	Archive	
Carcharodon carcharias	Fin clip, frozen	NS2018-07	Archive	
		<b>TOTAL</b>	<b>7</b>	<b>1.8 ml cryovials</b>
<b>SPECIES</b>	<b>SPECIMEN</b>	<b>SAMPLE ID</b>	<b>LOCATION</b>	
Carcharodon carcharias	Whole blood, in EtOH	NS2018-01	Naylor, ziplock	
Carcharodon carcharias	Whole blood, in EtOH	NS2018-02	Naylor, ziplock	
Carcharodon carcharias	Whole blood, in EtOH	NS2018-03	Naylor, ziplock	
Carcharodon carcharias	Whole blood, in EtOH	NS2018-04	Naylor, ziplock	
Carcharodon carcharias	Whole blood, in EtOH	NS2018-05	Naylor, ziplock	
Carcharodon carcharias	Whole blood, in EtOH	NS2018-06	Naylor, ziplock	
Carcharodon carcharias	Whole blood, in EtOH	NS2018-07	Naylor, ziplock	
		<b>TOTAL</b>	<b>7</b>	<b>50 ml falcon vial</b>
<b>SPECIES</b>	<b>SPECIMEN</b>	<b>SAMPLE ID</b>	<b>LOCATION</b>	
Carcharodon carcharias	Microbiology swab, RNA la	NS2018-01, Gill	Stewart, 1	
Carcharodon carcharias	Microbiology swab, RNA la	NS2018-01, Gill	Stewart, 2	
Carcharodon carcharias	Microbiology swab, RNA la	NS2018-01, Skin	Stewart, 3	
Carcharodon carcharias	Microbiology swab, RNA la	NS2018-01, Skin	Stewart, 4	
Carcharodon carcharias	Microbiology swab, RNA la	NS2018-01, Cloa	Stewart, 5	
Carcharodon carcharias	Microbiology swab, RNA la	NS2018-01, Cloa	Stewart, 6	
Carcharodon carcharias	Microbiology swab, RNA la	NS2018-02, Gill	Stewart, 11	
Carcharodon carcharias	Microbiology swab, RNA la	NS2018-02, Gill	Stewart, 12	
Carcharodon carcharias	Microbiology swab, RNA la	NS2018-02, Skin	Stewart, 13	
Carcharodon carcharias	Microbiology swab, RNA la	NS2018-02, Skin	Stewart, 14	
Carcharodon carcharias	Microbiology swab, RNA la	NS2018-02, Cloa	Stewart, 15	
Carcharodon carcharias	Microbiology swab, RNA la	NS2018-02, Cloa	Stewart, 16	
Carcharodon carcharias	Microbiology swab, RNA la	NS2018-03, Gill	Stewart, 21	

Carcharodon carcharias	Microbiology swab, RNA la	NS2018-03, Skin	Stewart, 22	
Carcharodon carcharias	Microbiology swab, RNA la	NS2018-03, Cloa	Stewart, 23	
Carcharodon carcharias	Microbiology swab, RNA la	NS2018-04, Gill	Stewart, 31	
Carcharodon carcharias	Microbiology swab, RNA la	NS2018-04, Skin	Stewart, 32	
Carcharodon carcharias	Microbiology swab, RNA la	NS2018-04, Cloa	Stewart, 33	
Carcharodon carcharias	Microbiology swab, RNA la	NS2018-05, Gill	Stewart, 41	
Carcharodon carcharias	Microbiology swab, RNA la	NS2018-05, Skin	Stewart, 42	
Carcharodon carcharias	Microbiology swab, RNA la	NS2018-05, Cloa	Stewart, 43	
Carcharodon carcharias	Microbiology swab, RNA la	NS2018-06, Gill	Stewart, 51	
Carcharodon carcharias	Microbiology swab, RNA la	NS2018-06, Skin	Stewart, 52	
Carcharodon carcharias	Microbiology swab, RNA la	NS2018-06, Cloa	Stewart, 53	
Carcharodon carcharias	Microbiology swab, RNA la	NS2018-07, Gill	Stewart, 61	
Carcharodon carcharias	Microbiology swab, RNA la	NS2018-07, Skin	Stewart, 62	
Carcharodon carcharias	Microbiology swab, RNA la	NS2018-07, Cloa	Stewart, 63	
		<b>TOTAL</b>	<b>27</b>	<b>1.5 ml cryovials</b>
<b>SPECIES</b>	<b>SPECIMEN</b>	<b>SAMPLE ID</b>	<b>LOCATION</b>	
Copepoda (subclass)	Ectoparasites, in alcohol	NS2018-01, A	Bullard	
Copepoda (subclass)	Ectoparasites, in alcohol	NS2018-01, B	Bullard	
Copepoda (subclass)	Ectoparasites, in alcohol	NS2018-01, D	Bullard	
Copepoda (subclass)	Ectoparasites, in alcohol	NS2018-01, E	Bullard	
Copepoda (subclass)	Ectoparasites, in alcohol	NS2018-01, H	Bullard	
Copepoda (subclass)	Ectoparasites, in alcohol	NS2018-02, I	Bullard	
Copepoda (subclass)	Ectoparasites, in alcohol	NS2018-02, J	Bullard	
Copepoda (subclass)	Ectoparasites, in alcohol	NS2018-02, K	Bullard	
Copepoda (subclass)	Ectoparasites, in alcohol	NS2018-02, L	Bullard	
Copepoda (subclass)	Ectoparasites, in alcohol	NS2018-03, P	Bullard	
Copepoda (subclass)	Ectoparasites, in alcohol	NS2018-03, Q	Bullard	
Copepoda (subclass)	Ectoparasites, in alcohol	NS2018-03, R	Bullard	
Copepoda (subclass)	Ectoparasites, in alcohol	NS2018-03, S	Bullard	
Copepoda (subclass)	Ectoparasites, in alcohol	NS2018-03, M	Bullard	
Copepoda (subclass)	Ectoparasites, in alcohol	NS2018-04, C	Bullard	
Copepoda (subclass)	Ectoparasites, in alcohol	NS2018-04, F	Bullard	
Copepoda (subclass)	Ectoparasites, in alcohol	NS2018-04, G	Bullard	
Copepoda (subclass)	Ectoparasites, in alcohol	NS2018-04, N	Bullard	
Copepoda (subclass)	Ectoparasites, in alcohol	NS2018-04, O	Bullard	
Copepoda (subclass)	Ectoparasites, in alcohol	NS2018-05, W	Bullard	
Copepoda (subclass)	Ectoparasites, in alcohol	NS2018-05, Y	Bullard	
Copepoda (subclass)	Ectoparasites, in alcohol	NS2018-05, Z	Bullard	
Copepoda (subclass)	Ectoparasites, in alcohol	NS2018-06, T	Bullard	
Copepoda (subclass)	Ectoparasites, in alcohol	NS2018-06, U	Bullard	
Copepoda (subclass)	Ectoparasites, in alcohol	NS2018-06, V	Bullard	
Copepoda (subclass)	Ectoparasites, in alcohol	NS2018-06, X	Bullard	
Copepoda (subclass)	Ectoparasites, in alcohol	NS2018-07, AF	Bullard	
Copepoda (subclass)	Ectoparasites, in alcohol	NS2018-07, AG	Bullard	
Copepoda (subclass)	Ectoparasites, in alcohol	NS2018-07, AI	Bullard	
		<b>TOTAL</b>	<b>29</b>	<b>3 ml vials</b>



SPECIES	SPECIMEN	SAMPLE ID	LOCATION	
Carcharodon carcharias	White blood cells, EM Fixa	NS2018-01	Refrigerator	
Carcharodon carcharias	White blood cells, EM Fixa	NS2018-02	Refrigerator	
Carcharodon carcharias	White blood cells, EM Fixa	NS2018-03	Refrigerator	
Carcharodon carcharias	White blood cells, EM Fixa	NS2018-06	Refrigerator	
Carcharodon carcharias	White blood cells, EM Fixa	NS2018-07	Refrigerator	
		<b>TOTAL</b>		<b>5 vials</b>
SPECIES	SPECIMEN	SAMPLE ID	LOCATION	
Carcharodon carcharias	Feces, Frozen	NS2018-05	Newton, Hyatt	
Carcharodon carcharias	Feces, Frozen	NS2018-05	Newton, Hyatt	
Carcharodon carcharias	Feces, Frozen	NS2018-05	Newton, Hyatt	
Carcharodon carcharias	Feces, Frozen	NS2018-05	Newton, Hyatt	
Carcharodon carcharias	Feces, Frozen	NS2018-05	Newton, Hyatt	
Carcharodon carcharias	Feces, Frozen	NS2018-05	Newton, Hyatt	
Carcharodon carcharias	Feces, Frozen	NS2018-05	Newton, Hyatt	
Carcharodon carcharias	Feces, Frozen	NS2018-06	Newton, Hyatt	
		<b>TOTAL</b>		<b>8 5 ml cryovials</b>
SPECIES	SPECIMEN	SAMPLE ID	LOCATION	
Carcharodon carcharias	Blood smear, methanol fix	NS2018-01	Hoopes, metagenomics	
Carcharodon carcharias	Blood smear, methanol fix	NS2018-01	Hoopes, metagenomics	
Carcharodon carcharias	Blood smear, methanol fix	NS2018-02	Hoopes, metagenomics	
Carcharodon carcharias	Blood smear, methanol fix	NS2018-02	Hoopes, metagenomics	
Carcharodon carcharias	Blood smear, methanol fix	NS2018-03	Hoopes, metagenomics	
Carcharodon carcharias	Blood smear, methanol fix	NS2018-03	Hoopes, metagenomics	
Carcharodon carcharias	Blood smear, methanol fix	NS2018-04	Hoopes, metagenomics	
Carcharodon carcharias	Blood smear, methanol fix	NS2018-04	Hoopes, metagenomics	
Carcharodon carcharias	Blood smear, methanol fix	NS2018-05	Hoopes, metagenomics	
Carcharodon carcharias	Blood smear, methanol fix	NS2018-05	Hoopes, metagenomics	
Carcharodon carcharias	Blood smear, methanol fix	NS2018-06	Hoopes, metagenomics	
Carcharodon carcharias	Blood smear, methanol fix	NS2018-06	Hoopes, metagenomics	
Carcharodon carcharias	Blood smear, methanol fix	NS2018-07	Hoopes, metagenomics	
Carcharodon carcharias	Blood smear, methanol fix	NS2018-07	Hoopes, metagenomics	
Carcharodon carcharias	Blood smear, methanol fix	NS2018-01 #1	Newton	
Carcharodon carcharias	Blood smear, methanol fix	NS2018-01 #1	Newton	
Carcharodon carcharias	Blood smear, methanol fix	NS2018-01 #1	Newton	
Carcharodon carcharias	Blood smear, methanol fix	NS2018-01 #1	Newton	
Carcharodon carcharias	Blood smear, methanol fix	NS2018-01 #2	Newton	
Carcharodon carcharias	Blood smear, methanol fix	NS2018-01 #2	Newton	
Carcharodon carcharias	Blood smear, methanol fix	NS2018-01 #2	Newton	
Carcharodon carcharias	Blood smear, methanol fix	NS2018-01 #2	Newton	
Carcharodon carcharias	Blood smear, methanol fix	NS2018-02 #1	Newton	
Carcharodon carcharias	Blood smear, methanol fix	NS2018-02 #1	Newton	
Carcharodon carcharias	Blood smear, methanol fix	NS2018-02 #1	Newton	
Carcharodon carcharias	Blood smear, methanol fix	NS2018-02 #1	Newton	
Carcharodon carcharias	Blood smear, methanol fix	NS2018-02 #2	Newton	
Carcharodon carcharias	Blood smear, methanol fix	NS2018-02 #2	Newton	



SPECIES	SPECIMEN	SAMPLE ID	LOCATION	
Carcharodon carcharias	Semen, refrigerated	NS2018-03, Raw	Refrigerator	
Carcharodon carcharias	Semen, refrigerated	NS2018-03, 1:10	Refrigerator	
Carcharodon carcharias	Semen, refrigerated	NS2018-03, 1:10	Refrigerator	
		<b>TOTAL</b>		<b>3 Falcon tubes</b>
SPECIES	SPECIMEN	SAMPLE ID	LOCATION	
Carcharodon carcharias	Semen, in EM fixative	NS2018-03	Refrigerator	
Carcharodon carcharias	Semen, in fixative	NS2018-03	Refrigerator	
Carcharodon carcharias	Semen, in fixative	NS2018-03	Refrigerator	
		<b>TOTAL</b>		<b>3 1.8 ml cryovials</b>
SPECIES	SPECIMEN	SAMPLE ID	LOCATION	
Carcharodon carcharias	Semen smear, methanol fix	NS2018-03	Newton, slide box	
Carcharodon carcharias	Semen smear, methanol fix	NS2018-03	Newton, slide box	
		<b>TOTAL</b>		<b>2 Slides</b>
SPECIES	SPECIMEN	SAMPLE ID	LOCATION	
Carcharodon carcharias	Urine, frozen	Not collected		
SPECIES	SPECIMEN	SAMPLE ID	LOCATION	
Carcharodon carcharias	Semen, frozen	NS2018-03	Newton, Hyatt	
Carcharodon carcharias	Semen, frozen	NS2018-03	Newton, Hyatt	
		<b>TOTAL</b>		<b>2 1.8 ml cryovials</b>
SPECIES	SPECIMEN	SAMPLE ID	LOCATION	
N/A	Water sample, filter paper	NS2018-01	Stewart	
N/A	Water sample, filter paper	NS2018-03	Stewart	
N/A	Water sample, filter paper	NS2018-04	Stewart	
N/A	Water sample, filter paper	NS2018-05	Stewart	
N/A	Water sample, filter paper	NS2018-06	Stewart	
		<b>TOTAL</b>		<b>5 1.8 ml cryovials</b>

## **OCEARCH NORTH ATLANTIC WHITE SHARK RESEARCH NOVA SCOTIA, CANADA 2018**

**Field Research September 20 - October 9, 2018**

**Expedition Chief Scientist: R. Hueter, OCEARCH Chief Science Advisor**

**Projects and Principal Investigators: 16 Projects, 25 Principal Investigators, 18 Institutions**

### **SCIENCE BRIEFS FOR PROJECTS I-XVI:**

#### **I. Movements of white sharks and other large shark species in the Atlantic Ocean**

**R. Hueter, [REDACTED] – Mote Marine Laboratory**

**B. Franks – Jacksonville University**

**T. Maddigan – Fisheries and Oceans Canada (DFO)**

**N. Hussey – University of Windsor**

**[REDACTED] – Applied Physics Laboratory, University of Washington**

**[REDACTED] – Woods Hole Oceanographic Institution**

The objectives of this research are to examine fine- and broad-scale movements, habitat use, site fidelity, residency, and feeding behavior of white sharks and other large shark species in the northwest Atlantic Ocean using multiple technologies including passive acoustic telemetry and satellite-based tagging. We are tagging sharks with individually coded acoustic transmitters, as well as pop-up satellite (PSAT) and real-time satellite (SPOT) tags. Shark movements and behavior are passively tracked using acoustic receiver arrays. Movements will be correlated with those of prey species, which include gray seals and North Atlantic right whales in the case of the north Atlantic population of white sharks.

#### **II. Oceanographic associations of large pelagic predators in the Atlantic Ocean**

**[REDACTED] – Applied Physics Laboratory, University of Washington**

**[REDACTED] – Woods Hole Oceanographic Institution**

Oceanographic features, such as fronts and eddies, comprise the “internal weather” of the ocean. They structure open ocean ecosystems and likely have profound impacts on pelagic food webs. However, the influence of these features on open ocean fish communities, including sharks, remains poorly understood. This study seeks to use a combination of satellite tagging approaches to reconstruct movements of large pelagic sharks in 3D. Observed movements will be co-located to oceanographic features identified using remotely-sensed satellite data, which will improve understanding of how pelagic predators use these ubiquitous structures. By comparing observed patterns of feature use by the predators to satellite observations of ocean currents, temperature and other characteristics, we will link observed behavior to known physical-biological ocean processes. The anticipated results of this work will help inform future efforts to identify and appropriately manage critical oceanic habitats used by pelagic predators. Ultimately, the future of shark management and conservation relies on a comprehensive understanding of movements and critical habitat driven by knowledge of the oceanographic processes that influence species’ distribution and population dynamics.

### **III. Nutritional markers in sharks sampled in the North Atlantic**

**L. Hoopes – Georgia Aquarium**

**Wildlife Conservation Society/New York Aquarium**

Despite their ecological importance as top predators in marine ecosystems, few studies have monitored nutritional parameters in wild sharks. Understanding nutritional markers in free-ranging sharks can lend insight into the health of the animal and reveal clues about their diet in the wild. The goal of this project is to monitor nutritional markers in large pelagic sharks to evaluate health and diet in wild populations. Traditional nutritional parameters like trace minerals and vitamin levels will provide much needed baseline information about the nutritional health of the individual, while other nutritional markers, like fatty acids, can be used as non-invasive tracers in the investigation of diet since polyunsaturated fatty acids cannot be synthesized by sharks and must be obtained from the diet. This technique has the potential to provide information about the different dietary niches occupied by immature and mature animals within a species and on differences across species occupying similar geographical regions.

### **IV. Microbiome composition of juvenile and adult sharks**

**Georgia Institute of Technology**

**L. Hoopes – Georgia Aquarium**

**K. Ritchie – University of South Carolina, Beaufort**

The bacterial communities of the gastrointestinal tract play a critical role in regulating host development, immune homeostasis and metabolism, and disease state. The composition of the bacterial communities of the gut can be shaped by various factors, including diet, life stage, and environmental conditions. Our knowledge of the importance of the microbiome to animal health is well established for certain model species. However, for most animal groups, the diversity and function of microbiomes are almost completely unexplored. This is particularly true for marine species, including sharks. Determining the factors that affect shark microbiomes is critical for understanding host fitness and for explaining differences between ecosystems, species, and/or populations. Knowledge of microbiomes from sharks in the natural environment may also inform how we manage captive animals to maximize health. The goals of this study are to 1) identify the microbial communities from skin, gill and cloacal swabs of juvenile and adult pelagic sharks; 2) characterize the physiological properties of the microbiomes to identify potential differences in metabolic pathways within each community; and 3) determine if the microbiome can be used as a screening tool of diet preference between differing life stages of sharks. These questions will be answered using a combination of field sampling, microbiological methods, and high throughput sequence analysis. The results will enable a predictive understanding of microbiomes in shark health and ecology.

### **V. Prey identification through assessment of fecal DNA**

**Wildlife Conservation Society/New York Aquarium**

**L. Hoopes – Georgia Aquarium**

Reconstructing diets in sharks has previously depended on either indirect assessments of the food web (stable isotope analysis) or visual identification of prey remains within stomach contents, either during post mortem evaluation or through the process of gastric lavage. The latter techniques provide taxonomically crude and in some studies biased results and require either animal sacrifice or invasive techniques. Analyzing soft matrix material from fecal samples using DNA-based techniques has recently been validated in a number of terrestrial and aquatic vertebrate species as a non-invasive alternative to identify prey items. Our objectives are to: 1) determine if molecular techniques can be used to recover prey DNA from fecal samples collected through a cloacal wash technique; 2) to use molecular diagnostic tools to sequence prey DNA from shark feces with generic and species specific mitochondrial DNA primers; and 3) compare these results with tissue stable isotope and plasma fatty acid levels to better define the diet of Northwest Atlantic shark species.

## **VI. Microplastic trophic transfer and plastic-associated toxin exposure in North Atlantic sharks**

**[REDACTED] M. Hyatt – Wildlife Conservation Society/New York Aquarium**

**L. Hoopes – Georgia Aquarium**

Microplastics are now present in every marine environment and have emerged as a significant environmental threat and specific health concern for marine organisms. Ingestion, either directly or through trophic transfer from contaminated prey, can result in direct digestive tract damage, poor nutritional absorption and exposure to waterborne toxins, heavy metals and persistent organic pollutants (POPs) that are passively attracted to microplastics. High levels of microplastics have been reported in mesopelagic fishes in the Northwest Atlantic. Direct ingestion has been confirmed in a variety of filter-feeding megafauna (mobulid rays, filter-feeding sharks, baleen whales) and trophic transfer has been confirmed in marine mammals (grey seals). To date microplastic exposure has not been demonstrated in non-filter feeding sharks. As apex predators, sharks are at risk of exposure through trophic transfer from contaminated prey items. The goal of this study is to determine the impact of microplastics on Atlantic shark species through fecal evaluation and toxicologic analysis of blood and tissue samples. As part of a multi-institutional study, fecal samples, blood samples and small tissue samples will be collected non-lethally from a variety of shark species through routine cloacal flush, caudal sinus venipuncture and skin/muscle punch biopsy respectively. Blood and tissue samples will be evaluated for heavy metals and persistent organic pollutants. Fecal samples will be mesh fractionated and enzymatically digested to allow visual documentation of microplastics within the sample by microscopy. Polymer type of plastic fragments will be further identified by spectroscopy. In addition to documenting the presence or absence of microplastics exposure, correlations between particle presence, size, type and contaminant exposure will be determined.

## **VII. Assessing the health of Atlantic shark populations via hematology, plasma biochemistry, protein electrophoresis, cholesterol electrophoresis and acute phase proteins**

**[REDACTED], M. Hyatt – Wildlife Conservation Society/New York Aquarium**

**[REDACTED] – University of Florida**

Blood is a fundamental body fluid and evaluation of the cellular and humoral composition is critical in evaluating the baseline health of all animals. Studies of normal red and white cell morphology and documented reference ranges for blood counts and serum/plasma analytes remain limited in the shark and veterinary literature. Those that are available demonstrate diverse cellular morphologies and biochemical profiles by species. Complete hematologic and biochemical indices are valuable to documenting the health of the individual animals, assessing animals for signs of acute or chronic anthropogenic stress, and contribute to what we know of the normal physiology and health of Atlantic shark populations as a whole. The intent of this study is: 1) document packed cell volume, complete blood and differential cell counts; 2) document red cell, white cell and thrombocyte morphology by light and electron microscopy; 3) perform complete plasma chemistry analysis including protein electrophoresis, cholesterol electrophoresis and acute phase proteins; 4) generate normal reference values and morphologies for hematologic and biochemical indices for a variety of shark species; and 5) determine the health of examined individuals and Atlantic shark populations.

## **VIII. Physiological effects of capture stress in the white shark**

**[REDACTED] M. Hyatt – Wildlife Conservation Society/New York Aquarium**

**B. Franks – Jacksonville University**

**R. Hueter, [REDACTED] – Mote Marine Laboratory**

Given the importance of white shark post-release survivorship to population growth, a detailed assessment of the physical and physiological effects of capture and their subsequent impacts on survivorship is warranted. The objectives of the current study are to: (1) quantify relative acid-base,

electrolyte, and metabolite disturbances in the blood of white sharks exposed to capture, air exposure, and handling; and (2) examine immediate and delayed post-release mortality as revealed by satellite tracking.

#### **IX. Reproduction in white sharks**

##### **J. Gelsleichter – University of North Florida**

Little is known of the reproductive biology of the white shark in the western North Atlantic. We are taking advantage of direct access to live animals in the wild to obtain blood for the analysis of reproductive hormones (estradiol and progesterone for females, testosterone for males) using commercially available chemiluminescence immunoassays. In addition, ultrasound technology is being used to assess the reproductive status of females. In males, clasper characteristics will be qualified and quantified. Our objectives are to assess reproductive condition, reproductive cycle, gestation period, and fecundity. Of particular interest is to survey locations in the western North Atlantic that are serving as sites for white shark mating and pupping.

#### **X. Semen analysis of white sharks**

##### **M. Hyatt – Wildlife Conservation Society/New York Aquarium**

##### **██████████ – South Eastern Zoological Alliance for Reproductive Conservation (SEZARC)**

Little is known on standardized semen collection and analysis in white sharks. Sperm motility, viability, and morphology not only can add to the health assessment of this species, but also can be used to predict sperm maturation and time to breeding. Understanding the reproductive seasonality of mature male sharks when compared with satellite tracking may help identify breeding grounds.

#### **XI. Characterization of sperm DNA fragmentation in the white shark**

##### **██████████ – SeaWorld and Busch Gardens Species Preservation**

##### **Laboratory**

Percentage of sperm DNA integrity or fragmentation has been used in multiple mammalian and bony fish species as indicators of male fertility. The validity of this technique is being evaluated for other shark species at SeaWorld. This reproductive parameter has never been assessed in wild sharks before. Baseline data will be collected for white sharks so the data can be used as reference points for oceanic health evaluations and comparison with other sharks in the wild.

#### **XII. Body burdens and molecular responses to methyl mercury and persistent organic pollutants in Atlantic sharks**

##### **██████████ – Stony Brook University**

##### **██████████ – Cape Canaveral Scientific**

##### **M. Giraudo – Environment and Climate Change Canada**

Few published studies have quantified the body burdens of methylmercury (MeHg) and persistent organic pollutants (POPs) in sharks and their relatives. Documenting bioaccumulation alone, furthermore, is not enough to understand the effects of contaminants on sharks. The impacts of contaminant loading on cellular systems also need to be addressed, as bioaccumulation itself may not result in negative impacts. The objective of this research is to provide an integrated analysis of the accumulation of contaminants and cellular impacts of MeHg and POPs on Atlantic sharks. Small samples of muscle tissue will be collected from Atlantic sharks and analyzed for MeHg and POP content. Additionally, transcriptomic analysis of shark muscle tissue samples will be performed using quantitative polymerase chain reaction (qPCR) to evaluate differential RNA expression of a suite of transcripts known to be associated with MeHg and POP exposure and effects, to determine if important cellular systems may have been modified by contaminant exposure.

### **XIII. Comparative analysis of DNA sequence variation in the white shark**

**G. Naylor, [REDACTED] – University of Florida**

There are now a number of documented cases where pelagic fish species, like white sharks, that routinely migrate thousands of kilometers across the world's oceans show striking genetic sub-structure among populations. Such restricted gene flow in the face of extensive individual movement is generally taken to be an indicator of fidelity to a breeding site. Animals may range far and wide but return to the same site/region to breed. It follows from this that contrasting population genetic data with information from tracking studies can yield insights into breeding behavior and the incidence of philopatry. Our objective is to determine the global population structure among white sharks to provide a baseline against which tracking data can be interpreted. We will contrast population structure in white sharks deduced from comparative analysis of DNA sequence data with tracking information from the OCEARCH satellite tagging program.

### **XIV. Ectoparasites of white sharks and other shark species**

**[REDACTED] – Auburn University**

Ectoparasites commonly infect white sharks and are primarily represented by siphonostomes (Siphonostomatoida, Copepoda). Few of the parasite species are exclusive parasites of white sharks, but rather they are species which also infect a variety of other sharks and not necessarily those species with the closest phylogenetic ties to the white shark. The wide-ranging travels of large white sharks may provide an opportunity for such species-rich infections by placing the potential host in a wide variety of different habitats throughout the year where other, less migratory sharks and their ectoparasites exist. With the above in mind, the primary purpose of this project is to collect baseline ectoparasite data (parasite species presence, abundance, and infection site) from large white sharks and other widely ranging shark species, to see if the aforementioned cases represent anomalies or a more general characteristic of sharks worth further investigation.

### **XV. Visual physiology of white sharks**

**C. Bedore – Georgia Southern University**

The capabilities of sensory systems are correlated to the physical properties of the habitat in which they are used. To understand the sensitivity of white shark visual systems, we will (1) record shark eye size and total length and (2) model the sensitivity of the visual system, and (3) correlate eye size (sensitivity) to light habitat estimated from satellite tag data as sharks migrate between shallow and deep water, as well as across ocean basins. Understanding visual sensitivity of white shark eyes will help us to understand how these sharks forage and migrate in a wide range of spectral habitats.

### **XVI. Trophic ecology of white sharks in the western North Atlantic**

**[REDACTED] – Woods Hole Oceanographic Institution**

**[REDACTED] – Applied Physics Laboratory, University of Washington**

Understanding the trophic ecology of white sharks is important because as apex predators, they are likely to have a disproportionate influence on food web structure in coastal oceans. Conventional bulk stable isotope analyses used to determine trophic position (TP) are challenging for highly migratory species, such as white sharks, that move through isotopically distinct food webs and shift diets seasonally and ontogenetically. Recent advances in compound-specific stable isotope analysis (e.g. individual amino acids) have significantly reduced the influence of potentially confounding variables (shifting TP and different isotopic baselines) when determining TP of highly migratory species. Compound-specific stable isotope analyses will be conducted on muscle tissue from sharks sampled on OCEARCH to examine temporal shifts in TP, changes in isotopic baseline values, and/or migration between isotopically distinct habitats.



## PRELIMINARY SCIENCE REPORTS

December 21, 2018

**NOTE: Original data, figures and analyses in this preliminary report are not to be cited or used without the written permission of the lead author for each study.**

### **I. Movements of white sharks and other large shark species in the Atlantic Ocean**

**Collaborator Names:** Robert Hueter, [REDACTED] Bryan Franks, Trevor Maddigan, Nigel Hussey, [REDACTED]

**Institutions:** Mote Marine Laboratory, Jacksonville University, Fisheries and Oceans Canada (DFO), University of Windsor, University of Washington, Woods Hole Oceanographic Institution

#### **Description from Science Brief**

The objectives of this research are to examine fine- and broad-scale movements, habitat use, site fidelity, residency, and feeding behavior of white sharks and other large shark species in the northwest Atlantic Ocean using multiple technologies including passive acoustic telemetry and satellite-based tagging. We are tagging sharks with individually coded acoustic transmitters, as well as pop-up satellite (PSAT) and real-time satellite (SPOT) tags. Shark movements and behavior are passively tracked using acoustic receiver arrays. Movements will be correlated with those of prey species, which include gray seals and North Atlantic right whales in the case of the north Atlantic population of white sharks.

#### **Activities conducted onboard during 2018 Nova Scotia expedition**

There were 7 white sharks captured and processed during the expedition including 5 male and 2 female animals. In terms of acoustic telemetry, 6 of the 7 sharks had Vemco V16 transmitters implanted into the coelomic cavity. One shark (Shark ID # NS2018-02, Jefferson) did not receive a transmitter. Once this shark was brought onto the platform it was discovered that it had already been tagged with an external Vemco acoustic transmitter placed below the first dorsal fin. We recorded the tag number and tag condition with photographs and informed the tag owner of the capture. In terms of SPOT tags, six of the 7 sharks had tags attached to their first dorsal fins. One shark (Shark ID #NS2018-04, "Shorty") did not receive a SPOT tag as it was under the size threshold as outlined in our SARA permit at the time for tagging. (The permit was later amended while we were on expedition.) We also deployed 2 Pop-up Satellite Archival Tags (PSATs) during this expedition, one on a male (Shark ID #NS2018-01, Nova) and one on a female (Shark ID #NS2018-06, Jane). These were set for 12-month deployments.

#### **Results obtained from tagging activities as of December 9, 2018**

As acoustic telemetry relies on downloaded archived data from automated receivers, we have not received data from these tags as of yet. In terms of the PSATs, neither of the two tags have been detected which is to be expected. The fact that the constant-depth function has not been triggered indicated those two animals survived post-capture and release; this was validated by the SPOT data for those sharks. To date, the majority of the data received has been obtained from SPOT detections and we have received a total of 200 locations ( $\bar{x}$  = 33.3; 16-67). Maps are included below showing the raw detections for all Argos

location classes (3, 2, 1, 0, A, B) for the six sharks from the Nova Scotia expedition. Argos locations were visually checked for outliers and these were removed. For final analysis, formal filtering processes will be used, such as the Douglas filter, to remove unreasonable locations. All six sharks have given locations at least through November 20, 2018 and messages have been received for all sharks through December 5, 2018. This suggests that there has been a 100% survival rate of all sharks outfitted with SPOT tags on the Nova Scotia expedition.

#### Shark summaries

NS2018-01 (Nova) was caught and released on September 24, 2018. The date of the first satellite location for this shark was September 26, 2018. For 3 days post-tagging, locations showed movements near the tagging location after which no locations were received until November 10, 2018. From November 10 to November 21, locations were obtained regularly in the waters off North Carolina to South Carolina after which he continued migrating south. Eight days later, a single location was provided off East Florida after which the most recent detections have shown continued southerly movement to the Florida Keys. This shark moved from Nova Scotia to the Carolinas in approximately 6-7 weeks, remained in the waters of this region for at least 11 days, then moved to the Keys in approximately 2 weeks. A total of 16 locations have been obtained to date with 9 days receiving at least one location. Minimum straight line distance traveled between successive points totaled 2,831 km with an average of 36.8 km/day. This shark has shown the greatest displacement with its most recent location 2,674 km from the tagging site. (Note: This shark transmitted from the Gulf of Mexico on December 14, after calculations and Fig. A had been completed.)

NS2018-02 (Jefferson) was caught and released on September 24, 2018. The SPOT tag transmitted messages on September 27 and October 1 with no location obtained and the first location received on October 5, 2018. From October 5 to October 7, there were 16 locations provided by the SPOT tag showing movements concentrated in the area between Georges Bank and the New England coastline. Subsequent detections showed a similar pattern to Nova whereby the shark migrated along the US coastline down to the Carolinas and Georgia. The last location received on December 2 showed movement down to NE Florida. Minimum straight line distance traveled between successive points totaled 1,935 km with an average of 25.1 km/day and a maximum displacement of 2,121 km from the tagging site.

NS2018-03 (Hal) was caught and released on September 29, 2018. His SPOT tag transmitted messages on October 1 and 11 with no location obtained and the first location received was on October 15, 2018. The shark remained near the southern coast of Nova Scotia for approximately 2-3 weeks before moving southwest along the coast with locations obtained off the coast of Cape Cod, the mid-Atlantic coast, and the last detections in late November off the South Carolina coast. Minimum straight line distance traveled between successive points totaled 1,801 km with an average of 25.0 km/day and a maximum displacement of 1,713 km from the tagging site.

Shark NS2018-05 (Cabot) was caught and released on October 5, 2018. Messages were received with no location calculated on October 5, 9, and 11 while the first location was obtained on October 14, 2018 near the southeastern tip of Nova Scotia. The shark subsequently moved southwest and in closer to the coast of Massachusetts then off towards the shelf and continued in a southwesterly direction with the last locations off the coast of South Carolina and Georgia in early December. Minimum straight line distance traveled between successive points totaled 2,963 km with an average of 44.9 km/day and a maximum displacement of 1,838 km from the tagging site.

NS2018-06 (Jane) was caught and released on October 8, 2018 and her first SPOT location was received on October 18 near the shelf southeast of Nova Scotia. The shark subsequently moved west/southwest along Massachusetts and the last detections were received off the coast of the Delmarva peninsula. Minimum straight line distance traveled between successive points totaled 1,297 km with an average of 20.6 km/day and a maximum displacement of 1,195 km from the tagging site.

NS2018-07 (Luna) was caught and released on October 8, 2018. Messages were received with no location calculated on October 9 and 10 while the first location was obtained on October 11, 2018. To date we have received the highest number of locations from this shark with 67 Argos locations to date. She has shown the greatest differences in movements compared to the others as she moved in and out of the Bay of Fundy on 3 occasions and remained in the Gulf of Maine through late November before beginning southerly movements in early December. She is also the shark that is furthest north as of December 9 as her most recent location was approximately 140 km south of Georges Bank. Minimum straight line distance traveled between successive points totaled 2,642 km with an average of 41.9 km/day and a maximum displacement of 743 km from the tagging site.

Table 1: Summary information of 6 white sharks tagged with SPOT tags during the 2018 Nova Scotia expedition as of December 9, 2018.

Shark	Sex	Days at liberty	Number of messages	Number of locations	Number of days with location	Date of last message	Date of last location	Distance traveled between points (km)	Max. displacement (km)
Nova	Male	77	64	16	9	8-Dec-18	6-Dec-18	2831	2674
Jefferson	Male	77	68	24	8	5-Dec-18	2-Dec-18	1935	2121
Hal	Male	72	72	29	12	9-Dec-18	24-Nov-18	1801	1713
Cabot	Male	66	99	40	16	9-Dec-18	9-Dec-18	2963	1838
Jane	Female	63	58	24	9	9-Dec-18	20-Nov-18	1297	1195
Luna	Female	63	150	67	23	9-Dec-18	9-Dec-18	2642	743

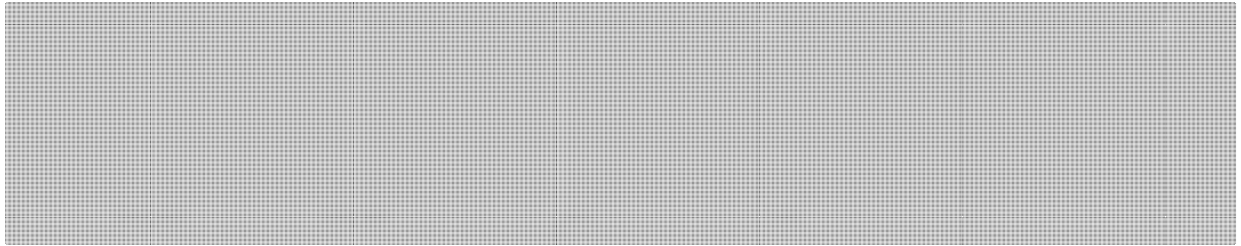
#### Overall summary of SPOT-derived movements

The four male sharks tagged showed directed movements south/southwest relatively soon after tagging suggesting migration to the overwintering areas was underway by late October/early November. By mid-November, all four sharks were located south of the mouth of the Chesapeake Bay and at least two of the four are presently off the Florida coast with one in the area between the Florida Keys and the Cay Sal Bank. Of the two females tagged, Jane began moving south soon after tagging and by late November she was located near the mouth of the Chesapeake Bay. Luna, the larger of the two females tagged, remained in northern waters significantly longer than all other sharks with locations off Nova Scotia, including the Bay of Fundy, and in the Gulf of Maine through early December, after which she began moving southward. This potentially demonstrates delayed migration or a different migratory pattern for this large female. To date, telemetry data shows that all sharks have migrated south to their overwintering areas off the U.S. coast. Data collected over the following months will allow us to better capture the patterns of movement while these sharks are in a winter residency state.

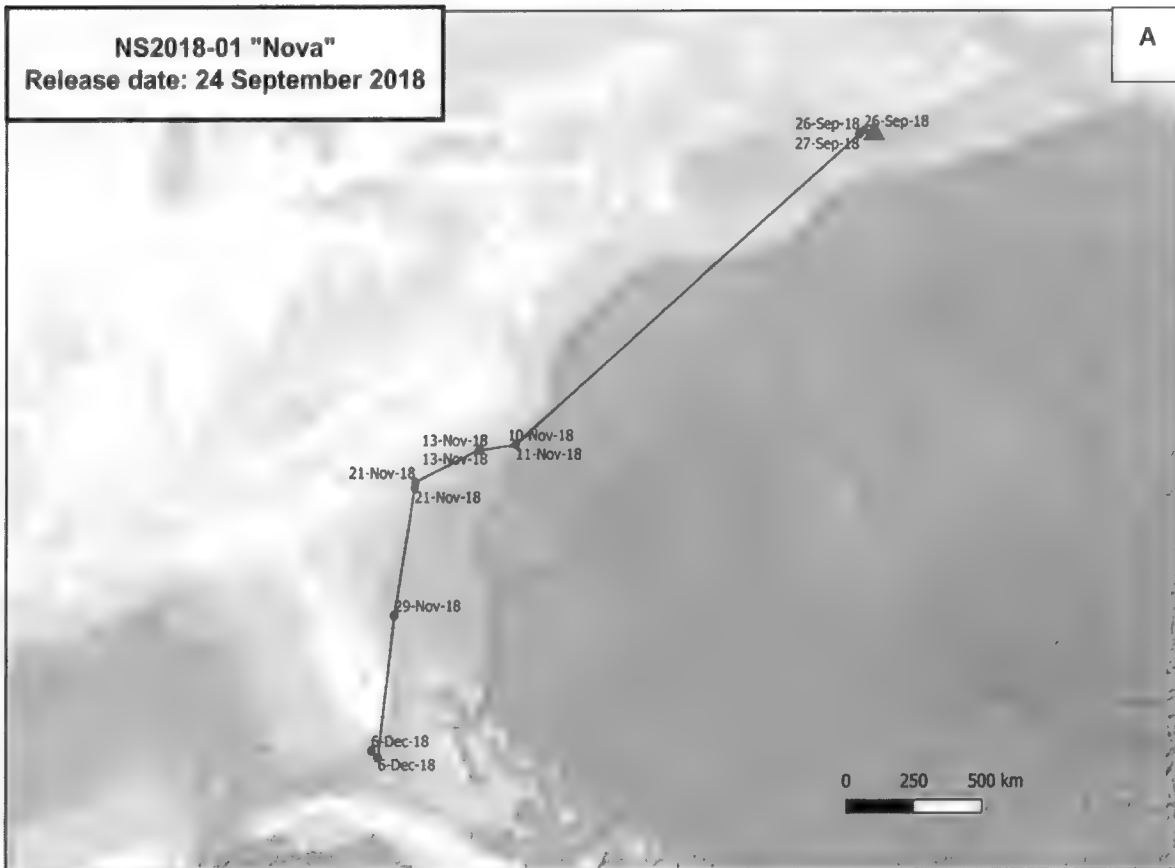
### Future work

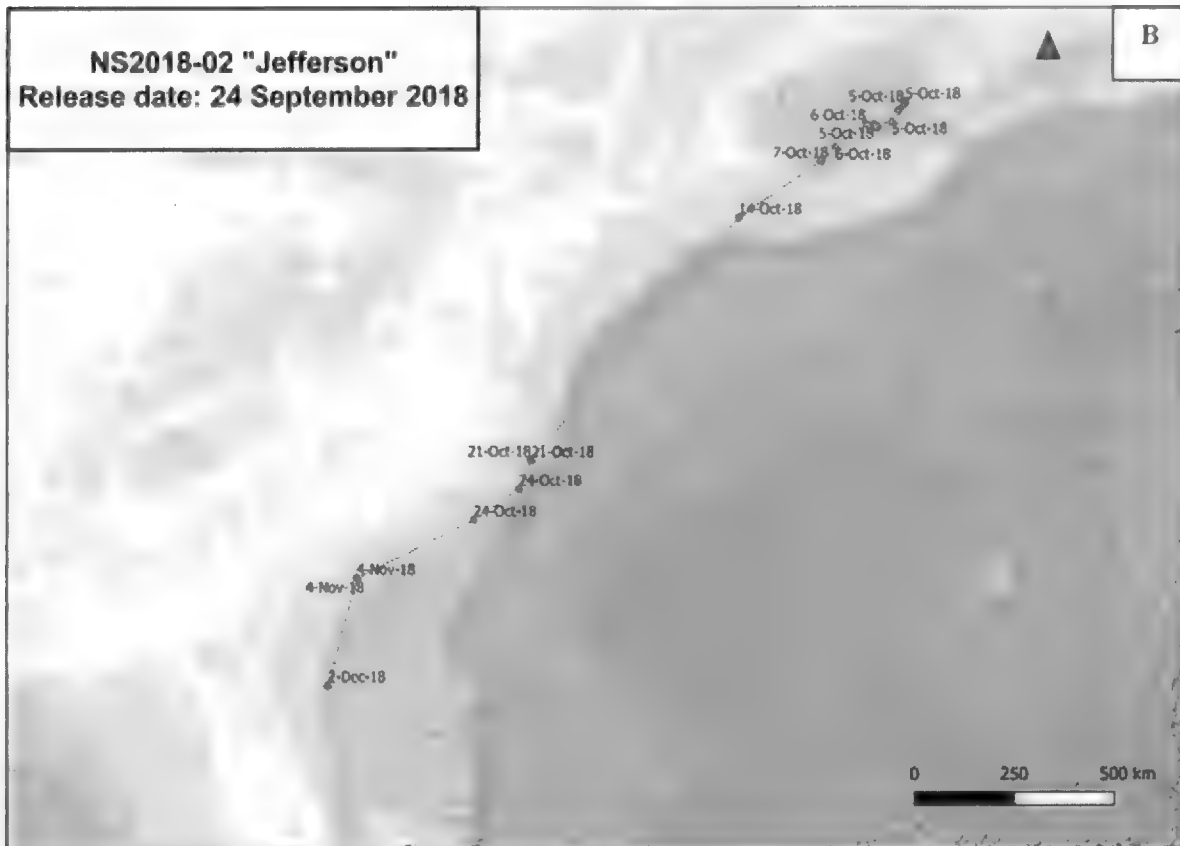
As more information is gathered with respect to movements/migration, we will begin more in-depth analyses of these data. These analyses will include additional filtering of locations, building regularized daily tracks for SPOT tagged sharks, and utilizing multiple models such as hidden Markov state-space models to better understand these movements. Further, these tracks will be analyzed with respect to a number of biotic and abiotic factors to better elucidate drivers of movement and migration. As sample size is increased, comparisons will be made to examine differences by age class, sex, and location. In addition, acoustic data as obtained has the potential to not only expand our location datasets but also allow us to better refine our movement models. Lastly, PSAT data will allow for analyses utilizing depth/temperature data that would otherwise be unattainable and give us the opportunity to compare models from data derived using different technologies.

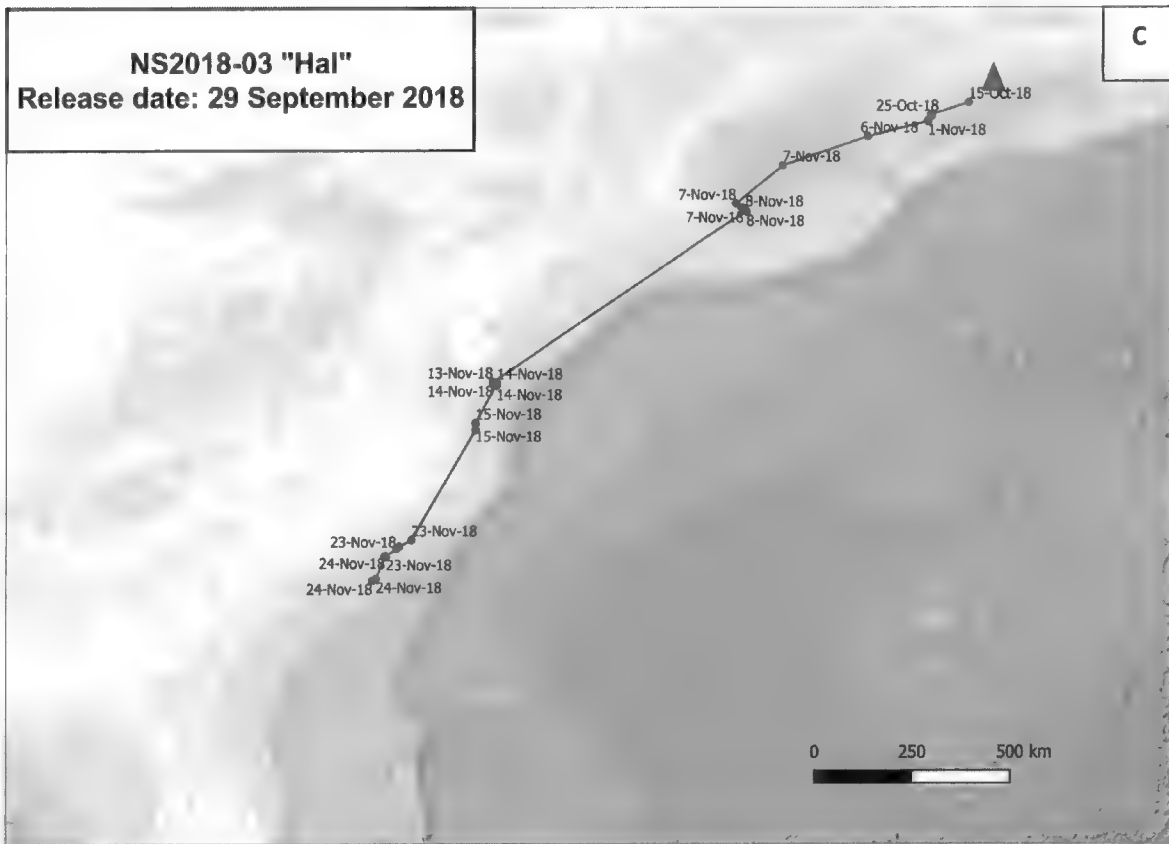
### Publications anticipated

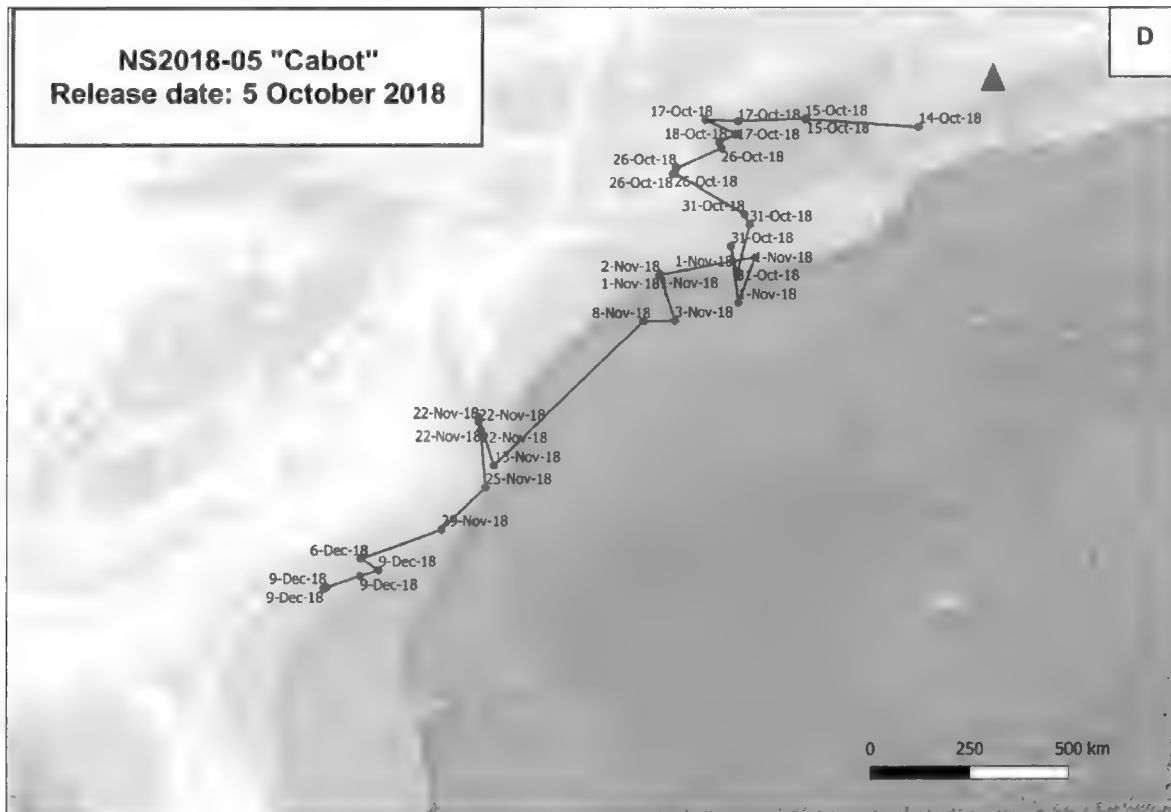


Figures A-F following: Maps showing all Argos detections and paths of SPOT-tagged sharks captured during the 2018 Nova Scotia expedition as of December 9, 2018. In each map, the red triangle denotes release location. Photos of each shark accompany the corresponding maps.

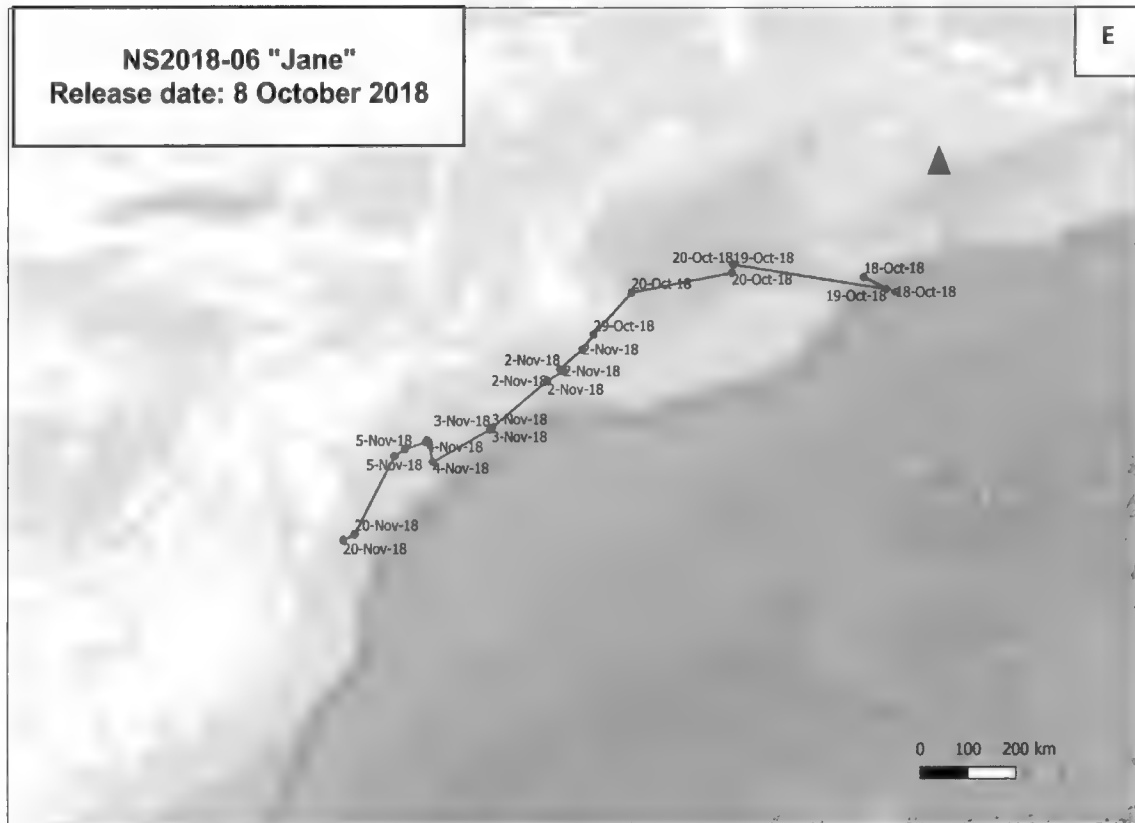














## **II. Oceanographic associations of large pelagic predators in the Atlantic Ocean**

**Collaborator Names:** [REDACTED]

**Institutions:** University of Washington, Woods Hole Oceanographic Institution

### **Brief description of specific project (from Science Brief):**

Oceanographic features, such as fronts and eddies, comprise the “internal weather” of the ocean. They structure open ocean ecosystems and likely have profound impacts on pelagic food webs. However, the influence of these features on open ocean fish communities, including sharks, remains poorly understood. This study seeks to use a combination of satellite tagging approaches to reconstruct movements of large pelagic sharks in 3D. Observed movements will be co-located to oceanographic features identified using remotely-sensed satellite data, which will improve understanding of how pelagic predators use these ubiquitous structures. By comparing observed patterns of feature use by the predators to satellite observations of ocean currents, temperature and other characteristics, we will link observed behavior to known physical-biological ocean processes. The anticipated results of this work will help inform future efforts to identify and appropriately manage critical oceanic habitats used by pelagic predators. Ultimately, the future of shark management and conservation relies on a comprehensive understanding of movements and critical habitat driven by knowledge of the oceanographic processes that influence species’ distribution and population dynamics.

### **Data collected / Samples obtained from Nova Scotia 2018 expedition:**

- Waiting for full satellite tag datasets.

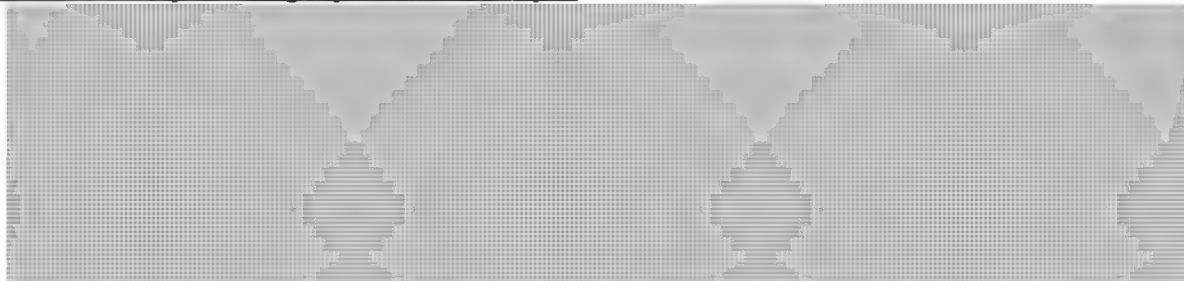
### **Results obtained as of 1 Dec 2018:**

- NA

### **Future analyses planned:**

- 1) Co-locating horizontal and vertical (where applicable) movements to oceanographic features such as mesoscale eddies
- 2) Assess how sharks use (sub)mesoscale oceanographic features in the NWA and compare to other taxa (e.g. ectothermic blue shark) and oceanographic regimes (e.g. Agulhas)
- 3) Evaluate concurrent satellite observations of the ocean environment with shark behavior to diagnose mechanistic drivers of and behavioral responses to oceanographic features

### **Publications anticipated using expedition data/samples:**



### **III. Nutritional markers in sharks sampled in the North Atlantic**

#### Collaborator Names:

Lisa A. Hoopes, Ph.D.

#### Institutions:

Georgia Aquarium

Wildlife Conservation Society/New York Aquarium

#### Brief description of specific project (from Science Brief):

Despite their ecological importance as top predators in marine ecosystems, few studies have monitored nutritional parameters in wild sharks. Understanding nutritional markers in free-ranging sharks can lend insight into the health of the animal and reveal clues about their diet in the wild. The goal of this project is to monitor nutritional markers in large pelagic sharks to evaluate health and diet in wild populations. Traditional nutritional parameters like trace minerals and vitamin levels will provide much needed baseline information about the nutritional health of the individual, while other nutritional markers, like fatty acids, can be used as non-invasive tracers in the investigation of diet since polyunsaturated fatty acids cannot be synthesized by sharks and must be obtained from the diet. This technique has the potential to provide information about the different dietary niches occupied by immature and mature animals within a species and on differences across species occupying similar geographical regions.

#### Data collected / Samples obtained from Nova Scotia 2018 expedition:

Plasma samples were collected from 7 white sharks during this expedition and submitted for trace mineral, vitamin, and fatty acid analyses

#### Results obtained as of 1 Dec 2018:

At the time of this report, only fatty acid data has been received from the Nova Scotia samples. Preliminary analyses that incorporate the Nova Scotia samples in the larger dataset (all samples from the western North Atlantic) show a distinct clustering of these samples compared with other sampled regions (Figure 1). The seven Nova Scotia samples increase the robustness of data analyses for sub-adult and adult animals within the larger dataset. The clustering of these seven samples together and separate from the other sampled individuals, broadly suggest differences in diet and foraging for these Nova Scotia animals. Distinct patterns in the structure of fatty acid profiles based on life history stage are also evident in the data structure. Statistical measures of dissimilarity suggest certain fatty acids (e.g., C18:1n9C and C20:5n3) may be driving these differences. Trace mineral and vitamin data from the Nova Scotia expedition are still being analyzed.

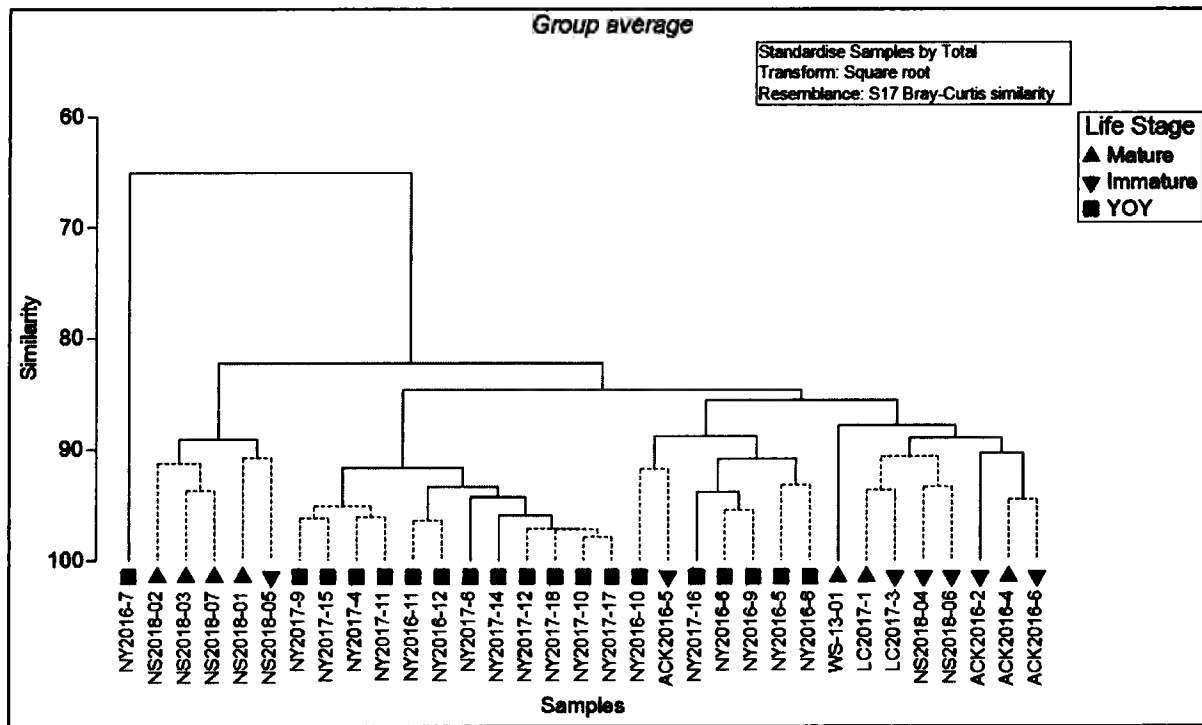


Figure 1. Cluster analysis of white sharks samples in western North Atlantic by life history stage.

Future analyses planned:

- The structure of the trace mineral and vitamin data will be explored once results are received from the lab.

Publications anticipated using expedition data/samples:

- 

#### **IV. Microbiome composition of juvenile and adult sharks**

Collaborator Names [REDACTED] Kim Ritchie<sup>2</sup>, Lisa Hoopes<sup>3</sup>, [REDACTED]

Institutions: <sup>1</sup>Georgia Institute of Technology; <sup>2</sup>University of South Carolina, Beaufort; <sup>3</sup>Georgia Aquarium

##### **Brief description of specific project (from Science Brief):**

The bacterial communities of the gastrointestinal tract play a critical role in regulating host development, immune homeostasis and metabolism, and disease state. The composition of the bacterial communities of the gut can be shaped by various factors, including diet, life stage, and environmental conditions. Our knowledge of the importance of the microbiome to animal health is well established for certain model species. However, for most animal groups, the diversity and function of microbiomes are almost completely unexplored. This is particularly true for marine species, including sharks. Determining the factors that affect shark microbiomes is critical for understanding host fitness and for explaining differences between ecosystems, species, and/or populations. Knowledge of microbiomes from sharks in the natural environment may also inform how we manage captive animals to maximize health. The goals of this study are to 1) identify the microbial communities from skin, gill and cloacal swabs of juvenile and adult pelagic sharks; 2) characterize the physiological properties of the microbiomes to identify potential differences in metabolic pathways within each community; and 3) determine if the microbiome can be used as a screening tool of diet preference between differing life stages of sharks. These questions will be answered using a combination of field sampling, microbiological methods, and high throughput sequence analysis. The results will enable a predictive understanding of microbiomes in shark health and ecology.

##### **Data collected / Samples obtained from Nova Scotia 2018 expedition:**

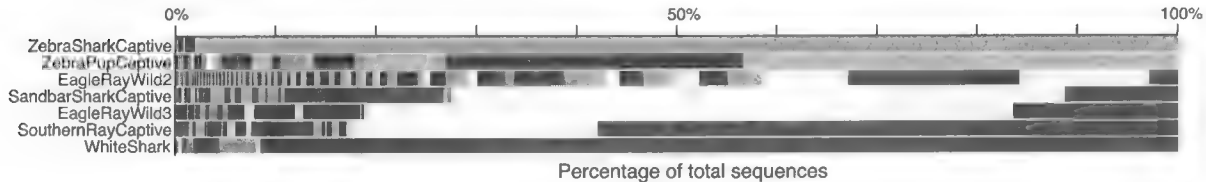
The Nova Scotia 2018 OCEARCH expedition retrieved samples from seven white shark individuals. From each of these, we have swabs of gill, skin, and cloaca surfaces, as well as plasma and blood smears. From individuals #1 and 2 we have duplicates of gill, skin, and cloaca swabs. We also have samples of the surrounding water column, as well as one fecal sample from individual #5. The latter is particularly valuable as it contains high microbial biomass and will therefore enable community genomic (metagenomic) exploration of the intestinal microbiome to understand the metabolic and physiological properties of this unique community.

##### **Results obtained as of 1 Dec 2018:**

Thus far we have extracted detectable DNA from the skin, cloaca, and gill samples of individuals 1 & 2. We focused first on these samples because replicate swabs are available for these two individuals. Using these extracts, we are now troubleshooting the PCR amplification of the molecular barcode (16S rRNA gene) that we use for microbiome taxonomic characterization. Once the amplifications are successful, we will move on to the other non-fecal samples.

For the one available fecal sample, we have successfully extracted DNA, amplified the barcode, and conducted high-throughput Illumina sequencing to characterize microbial taxonomic composition (fecal samples are typically easier to work with because of higher microbial biomass; thus, we were able to move more quickly with this sample).

The preliminary fecal microbiome results are noteworthy. We obtained over 20,000 16S rRNA gene sequences for this sample; this number is considerable and allows a deep investigation of taxonomic diversity. Despite this high recovery, we detected only 8 distinct amplicon sequence variants in the dataset (Fig. 1). These strains represent broad bacterial groups known to contain fish-associated members. However, this low diversity is striking, as yet unexplainable, and in contrast to the vast majority of fish-associated microbiome samples analyzed to date, including those from our lab (a subset of the latter is shown in Fig. 1 for comparison). Other fish microbiome samples typically contain hundreds of distinct sequence variants, often representing dozens of phyla.



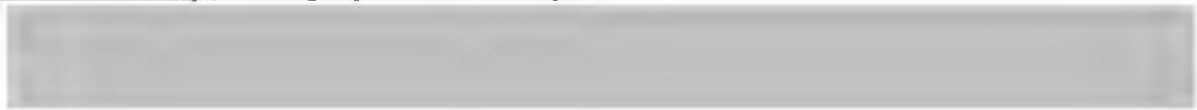
**Figure 1.** White shark fecal microbiomes are compositionally distinct from cloacal samples of other marine elasmobranchs. The plot shows the percentage of recovered sequences assigned to different bacterial groups (groups represent the finest taxonomic level that could be reliably assigned). The data from the white shark contained only 8 distinct sequence types, compared to hundreds in the cloacal samples of other elasmobranchs (fecal samples from other elasmobranchs are not available for comparison).

#### Future analyses planned:

To confirm the preliminary patterns (Fig. 1), we are now repeating the fecal microbiome 16S sequencing using triplicate DNA extractions from the same fecal sample X triplicate DNA PCR amplicon pools from each extract (9 additional replicates in total). Over the month of December 2018, we will move forward with the 16S analyses for the non-fecal samples. We will also use an aliquot of one of the fecal microbiome extracts for a preliminary round of shotgun metagenome sequencing (Illumina technology), with loading on the sequencer scheduled for the week of December 3. Additional metagenome sequencing and analysis will likely follow depending on the initial results.

We anticipate completing all 16S rRNA gene amplicon and metagenome analyses by the end of January 2019, at which point we will continue synthesizing these results into a manuscript describing the taxonomic diversity and functional properties of the white shark microbiome, with OCEARCH scientists as co-authors.

#### Publications anticipated using expedition data/samples:



## **V. Prey identification through assessment of fecal DNA**

### **Collaborator Names:**

Lisa A. Hoopes, PhD

### **Institutions:**

Wildlife Conservation Society/New York Aquarium  
Wildlife Conservation Society/Zoological Health Program  
Georgia Aquarium

### **Brief description of specific project (from Science Brief):**

Reconstructing diets in sharks has previously depended on either indirect assessments of the food web (stable isotope analysis) or visual identification of prey remains within stomach contents, either during post mortem evaluation or through the process of gastric lavage. The latter techniques provide taxonomically crude and in some studies biased results and require either animal sacrifice or invasive techniques. Analyzing soft matrix material from fecal samples using DNA-based techniques has recently been validated in a number of terrestrial and aquatic vertebrate species as a non-invasive alternative to identify prey items. Our objectives are to: 1) determine if molecular techniques can be used to recover prey DNA from fecal samples collected through a cloacal wash technique; 2) to use molecular diagnostic tools to sequence prey DNA from shark feces with generic and species specific mitochondrial DNA primers; and 3) compare these results with tissue stable isotope and plasma fatty acid levels to better define the diet of Northwest Atlantic shark species.

### **Data collected / Samples obtained from Nova Scotia 2018 expedition:**

A single fecal sample was collected from one subadult male animal during the expedition. This sample is archived along with 7 additional fecal samples from juvenile/YOY white sharks collected during a previous expedition. Stable isotope and plasma fatty acid analysis are being performed by collaborators in other sections of this science brief.

### **Results obtained as of 1 Dec 2018:**

The single sample from this expedition is archived with 7 other samples. Currently a pilot study is being performed using fecal samples from elasmobranchs in managed care (sand tiger, nurse shark, sand bar shark, zebra shark, whitetip reef shark) that are fed a known diet. These results will be used to validate the PCR results, reconstruct the known diet and determine if proportions of prey DNA in mixtures can be estimated. Results of isotope analysis and fatty acid analysis are discussed by other collaborators.

### **Future analyses planned:**

- PCR amplification of a general DNA barcoding genes (COI, Cytb and/or 16S) to amplify from samples with mixed prey species.
- High throughput DNA sequencing of recovered PCR products (DNA barcodes) for species identification.

### **Publications anticipated using expedition data/samples:**



## **VI. Microplastic trophic transfer and plastic-associated toxin exposure in North Atlantic sharks**

### **Collaborator Names:**

[REDACTED]  
 Lisa A. Hoopes, PhD  
 Michael W. Hyatt, DVM

### **Institutions:**

Wildlife Conservation Society/New York Aquarium  
 Environment and Climate Change, Canada  
 Georgia Aquarium

### **Brief description of specific project (from Science Brief):**

Microplastics are now present in every marine environment and have emerged as a significant environmental threat and specific health concern for marine organisms. Ingestion, either directly or through trophic transfer from contaminated prey, can result in direct digestive tract damage, poor nutritional absorption and exposure to waterborne toxins, heavy metals and persistent organic pollutants (POPs) that are passively attracted to microplastics. High levels of microplastics have been reported in mesopelagic fishes in the Northwest Atlantic. Direct ingestion has been confirmed in a variety of filter-feeding megafauna (mobulid rays, filter-feeding sharks, baleen whales) and trophic transfer has been confirmed in marine mammals (grey seals). To date microplastic exposure has not been demonstrated in non-filter feeding sharks. As apex predators, sharks are at risk of exposure through trophic transfer from contaminated prey items. The goal of this study is to determine the impact of microplastics on Atlantic shark species through fecal evaluation and toxicologic analysis of blood and tissue samples. As part of a multi-institutional study, fecal samples, blood samples and small tissue samples will be collected non-lethally from a variety of shark species through routine cloacal flush, caudal sinus venipuncture and skin/muscle punch biopsy respectively. Blood and tissue samples will be evaluated for heavy metals and persistent organic pollutants. Fecal samples will be mesh fractionated and enzymatically digested to allow visual documentation of microplastics within the sample by microscopy. Polymer type of plastic fragments will be further identified by spectroscopy. In addition to documenting the presence or absence of microplastics exposure, correlations between particle presence, size, type and contaminant exposure will be determined.

### **Data collected / Samples obtained from Nova Scotia 2018 expedition:**

A single fecal sample was collected from one subadult male animal during the expedition. This sample is archived along with 7 additional fecal samples from juvenile/YOY white sharks collected during a previous expedition. The toxicologic assessment in this animal and other is being performed as part of other studies covered in this science brief.

### **Results obtained as of 1 Dec 2018:**

The methodology to assess shark fecal samples for microplastic presence, type and associated POP's is currently in the technical stage of development in MG's laboratory. This lab is currently validating extraction protocols (chemical digestion and density separation) in non-white shark samples (mussel tissues, fish fecal samples) to optimize this process. Following optimization the white shark samples will be processed accordingly and microplastics recovered for assessment. The goal is to develop a fluorescent tagging approach as a tool to detect and quantify microplastics in the biota using a Forrier Transform Infrared (uFTIR) microscope to validate microplastic presence and identify polymer types.

Future analyses planned:

Pending the processing protocol, fecal samples will be processed and the microplastics will be collected on filters (dia: 47 mm), dried, stained with red Nile and placed between slides for microscopic examination using a fluorescent microscope and then shipped to our colleague who would examine them using a u-FTIR. This approach would enable the detection of particles ranging from 20 um to approx 1 mm. For larger plastic particles, a standard FTIR spectroscope could be used instead for polymer ID.

Publications anticipated using expedition data/samples:

**VII. Assessing the health of Atlantic shark populations via hematology, plasma biochemistry, protein electrophoresis, cholesterol electrophoresis and acute phase proteins**

Collaborator Names:



Michael Hyatt, DVM

Institutions:

Wildlife Conservation Society/New York Aquarium  
University of Florida

Brief description of specific project (from Science Brief):

Elasmobranchs, as apex predators, are important sentinel species of our oceans. Through studies of individual animal and population level health we can create a better understanding of overall ecosystem health. When viewed in conjunction with information on movement patterns, health information can be used to understand normal elasmobranch physiology, ecosystem pressures, anthropogenic stressors and better monitor the conservation status of a species. Basic health parameters in sharks such as red and white blood cell counts and differentials, plasma biochemistry and protein electrophoresis remain under-investigated across all elasmobranchs. The use of other potential markers of disease and anthropogenic stress such as protein electrophoresis and acute phase protein assessment need to be further assessed. Health assessments in wild elasmobranch populations are necessary to determine a baseline for all of these hematologic parameters. This type of basic health data is particularly lacking in white sharks due to limited access to these animals and the challenges associated with handling.

The intent of this study is to: 1) document packed cell volume, complete blood and differential cell counts; 2) document red cell, white cell and thrombocyte morphology by light and electron microscopy; 3) perform complete plasma chemistry analysis including protein electrophoresis, cholesterol electrophoresis and acute phase proteins; 4) generate normal reference intervals and describe morphologies for hematologic and biochemical indices for a variety of shark species; and 5) determine the health of examined individuals and Atlantic shark populations.

Data collected / Samples obtained from Nova Scotia 2018 expedition:

In all 7 white sharks' paired whole blood samples were collected during handling, one at the start of the procedure and one just prior to release. Both samples were processed within 1 minute of the release of the animal and the following data and samples were obtained from each sample (n=14):

- Packed cell volume (PCV): a measure of red blood cell mass
- Total solids (TS): a refractometric estimate of total protein
- Buffy coat (BC): a rough measure of white blood cell mass
- 4 blood smears for white blood cell morphology, white blood cell estimate and differential count, red blood cell morphology, and thrombocyte evaluation
- 100 ul in formalin for complete white and red blood cell hemocytometer counts
- 1.0 ml of plasma for plasma chemistry, protein electrophoresis, cholesterol electrophoresis and acute phase protein analysis
- Buffy coat (BC) fixed for electron microscopy (5 samples)

**Results obtained as of 1 Dec 2018:**

All diagnostic testing but for cholesterol electrophoresis and electron microscopy has been completed for 7 animals from the Nova Scotia expedition. Cholesterol electrophoresis is not currently being performed at our reference laboratory and will be completed at a future (currently undetermined) time. Electron microscopy will be completed by March 2019. The results from the Nova Scotia white sharks were compared to additional 5 adult and subadult white sharks evaluated on previous expeditions and were used to create baseline descriptive statistics and preliminary reference ranges for hematologic parameters, plasma chemistry, protein electrophoresis and acute phase protein analysis.

**Hematology:**

Baseline hematologic indices (PCV, TS, BC) and complete blood counts (CBC) including red blood cell (erythrocyte), platelet (thrombocyte) and white blood cell (leukocyte) counts, are used as a broad screening tool of general health status. Paired with a differential count, which counts the numbers and proportions of the different white blood cell types and documents erythrocyte, leukocyte and thrombocyte morphology, evidence of inflammation or anthropogenic stress can be detected. Caution is warranted when evaluating new elasmobranch species to first identify normal white blood cell morphology before progressing to complete blood counts and differentials to avoid spurious results.

The tables below compare baseline hematologic indices (PCV, TS, BC) between the previously examined white sharks and the animals caught in Nova Scotia (Table 1) and presents preliminary reference ranges for subadult and adult white sharks (Table 2). These analyses provide a rough estimate of red blood cell counts, white blood cell counts and protein concentrations in the blood. There is only one previous publication that describes a limited range of hematologic indices for white sharks (PCV, hemoglobin, mean corpuscular hemoglobin, white blood cell differential). The PCV we noted is similar to what was previously reported (Emery, 1986). The TS and BC in these animals are similar to what has been reported in other species of elasmobranchs. There was one Nova Scotia animal with a slightly elevated BC (3%), which could indicate an underlying inflammatory process or an early stress response. This animal will be further evaluated.

**TABLE 1:**

Analyte	Unit	Previous White Sharks (N=5)				Nova Scotia White Sharks (N=7)			
		Mean	Median	Min-Max	SD	Mean	Median	Min-Max	SD
PCV	%	34.2	36	24-40	6.50	34	34	29-38	3.60
TS	gm/dL	6.12	6.4	4.8-7.2	0.93	9.19	9.2	8.3-10.2	0.58
BC	%	1.75	2	1-2	0.5	1.43	1	1-3	0.79

**TABLE 2:**

		Preliminary Hematologic Indices in Adult and Subadult White Sharks (N=12)			
Analyte	Unit	Mean	Median	Min-Max	SD
PCV	%	34	35	24-40	4.7
TS	gm/dL	7.9	8.55	4.8-10.2	1.7
BC	%	1.5	1	1-3	0.7

There are no descriptions in the literature of the peripheral blood of normal white sharks so our initial work has focused on documenting and describing white cell morphology in preparation for performing complete counts and differentials. Hemocytometer counts on formalin fixed samples were performed to evaluate red and white blood cell concentrations according the previously published protocols in elasmobranchs. The white blood cell counts demonstrated significant differences from slide estimates, a problem that has been noted in some other elasmobranch species (personal experience). This may be due to rapid clumping, cell lysis or an aberrant reaction to fixation due to the difference in osmolality. These findings indicate a need to improve fixation and technique for future expeditions.

Blood smear white blood cell estimates and differential counts were performed. Sample 1 is considered to be closest to baseline as it was collected earliest during handling. Sample 2 was also evaluated to detect possible changes in white cell count due to handling stress. The counts in sample 1 (Table 3) are similar to other elasmobranch species (Arnold, 2005; Haman, 2012). The distribution of white blood cell types is also similar with lymphocytes the predominant cell type compared to granulocytes. Mature granulocytes predominate over immature granulocytes a finding that suggests there is no underlying antigenic stimulation or inflammation. In the second sample counts are similar but an interesting hematologic response is noted. There is a trend toward an increase in mean/median mature neutrophil count and a decrease in mean/median lymphocyte count when compared to the first sample. This trend is consistent with what is known as a 'stress leukogram', a hematologic response to endogenous corticosteroid release. This is a primary stress response reported across all animals. Although this has been documented previously in elasmobranchs (Frick, 2009) this may be the first time it has been documented in the white blood cell count of an elasmobranch species over such a short time course.

**TABLE 3: Preliminary reference range for white blood cell count and differential counts in subadult and adult white sharks**

Analyte	Unit	Sample 1 (N=12)				Sample 2 (N=12)			
		Mean	Median	Min-Max	SD	Mean	Median	Min-Max	SD
WBC estimate	K/ $\mu$ l	27.91	28.45	19.8-36.2	5.7	29.08	28.85	22.4-37.3	5.09
Immature neutrophils	K/ $\mu$ l	0.29	0.27	0.0-0.72	0.26	0.27	0.28	0.00-0.72	0.25
Mature neutrophils	K/ $\mu$ l	9.14	8.50	5.00-17.00	3.1	12.53	12.00	8.40-18.00	2.92
Immature CEG	K/ $\mu$ l	0.60	0.48	0.0-1.60	0.52	0.27	0.26	0.00-0.87	0.28
Mature CEG	K/ $\mu$ l	4.53	3.70	2.10-9.80	2.49	4.76	5.00	1.40-7.10	2.07
Immature FEG	K/ $\mu$ l	0.17	0.21	0.00-0.48	0.17	0.02	0.00	0.00-0.27	0.08
Mature FEG	K/ $\mu$ l	0.65	0.64	0.23-1.30	0.31	0.85	0.73	0.45-2.20	0.47
Lymphocytes	K/ $\mu$ l	11.74	12.00	8.50-17.00	2.84	9.30	9.30	6.30-13.00	1.98
Monocytes	K/ $\mu$ l	0.74	0.68	0.26-1.80	0.45	1.18	0.87	0.68-2.40	0.57
Basophils	K/ $\mu$ l	0.75	0.00	0.00-9.00	2.60	0.00	0.00	0.00	0.00

We photographically documented white shark white blood cell morphology and cell identification was compared between two board certified veterinary pathologists. The only carcharhiniform species for which blood cell morphology is published is sandbar sharks, *Carcharhinus plumbeus* (Arnold, 2005). Lymphocyte, monocyte, basophil and coarse eosinophilic granulocyte (CEG) morphologies in white

sharks were very similar to these published images. Both pathologists noted that two cell types within the granulocyte lineages, neutrophils and fine eosinophilic granulocytes (FEG), are morphologically very similar to each other leading to questions regarding identification. Although these cells could be differentiated from one another, additional testing is being sought to determine granule and cytochemical features and confirm identification. Electron microscopy is pending, which will assist with identification. On future expeditions white blood cell smears will be created from the blood samples for cytochemical staining.

#### Plasma Chemistry:

Plasma electrolytes and enzymes can serve as indicators of organ function and/or damage due to disease. Existing biochemical reference intervals in elasmobranchs are often based on low numbers of animals (<30 and at times <10) in contrast to the at least 60 reference individuals required under international recommendations. 20 to 40 reference individuals can be used to establish preliminary reference intervals. Larger sample sizes from healthy sharks help narrow the reference intervals and result in a more accurate reference range for comparison. With inclusion of the Nova Scotia white sharks to date we have performed serum biochemistry panels on 13 subadult and adult animals. The table below (Table 4) demonstrates descriptive statistics of the mean, median, minimum and maximum, and standard deviation; providing a preliminary reference range for future health studies. No significant variations from chemistry ranges in other elasmobranch species were noted (Harms, 2002; Haman, 2012).

**TABLE 4:**

		<b>Preliminary Chemistry Ranges for Subadult and Adult White sharks (N=13)</b>			
<b>Analyte</b>	<b>Unit</b>	<b>Mean</b>	<b>Median</b>	<b>Min-Max</b>	<b>SD</b>
<b>AST</b>	U/L	39.25	38.0	19.0-64.0	14.1
<b>BUN</b>	mg/dL	1000.6	1013.0	408.0-1283.0	218.6
<b>Calcium</b>	mg/dL	15.8	15.4	14.3-19.5	1.7
<b>Cholesterol</b>	mg/dL	62.0	53.0	48.0-96.0	20.6
<b>Chloride</b>	mmol/L	274.1	271.0	236.0-307.0	22.3
<b>CO<sub>2</sub></b>	mmol/L	7	7	5-9	1.2
<b>CPK</b>	U/L	118.7	64.0	23.0-647.0	180.3
<b>GGT</b>	U/L	13.6	12.0	8.0-21.0	4.8
<b>Glucose</b>	mg/dL	92.3	92.5	76.0-107.0	8.7
<b>Potassium</b>	mmol/L	4.3	4.3	2.7-5.2	0.7
<b>Magnesium</b>	mg/dL	3.4	3.3	2.8-4.2	0.5
<b>Sodium</b>	mmol/L	282.9	283.0	253-324	24.3
<b>Calculated Osmolality</b>		893.7	895.5	621.0-1066.0	107.9
<b>Phosphorus</b>	mg/dL	7.3	7.1	4.9-11.3	1.6
<b>Triglycerides</b>	mg/dL	86.9	75.5	35.0-229	56.8
<b>Uric acid</b>	mg/dL	0.25	0.3	0.2-0.3	0.05

#### Protein Electrophoresis:

To better define and detect inflammatory disease processes, advanced diagnostics are a useful complement to the complete blood count and differential. Such tests include plasma protein electrophoresis (EPH), cholesterol electrophoresis (chol EPH), and acute phase proteins (APP) evaluation.

Plasma EPH allows for the quantitation of albumin and several fractions of proteins and has been increasingly utilized in avian and reptile species to assist in the diagnosis of ongoing infectious and inflammatory diseases, as well as monitoring response to treatment. Changes in plasma protein trends can indicate subtle disease processes that do not manifest clinically such as underlying systemic infection or subclinical organ pathology. The table below (Table 5) provides a preliminary reference range for plasma proteins in white sharks. As in the few elasmobranch studies published we found that albumin was negligible and protein electrophoretograms are dominated by large beta globulin fractions (Krol, 2014; Hyatt et al., 2016).

**TABLE 5:**

		<b>Preliminary Protein Ranges for Subadult and Adult White sharks (N=13)</b>			
<b>Analyte</b>	<b>Unit</b>	<b>Mean</b>	<b>Median</b>	<b>Min-Max</b>	<b>SD</b>
<b>TP</b>	g/dL	3.0	3.1	2.3-3.6	0.4
<b>A/G ratio</b>		0.05	0.01	0.01-0.38	0.1
<b>Pre-Alb</b>	g/dL	0.001	0	0-0.09	0.02
<b>Albumin</b>	g/dL	0.11	0.04	0.02-0.74	0.19
<b><math>\alpha</math>1-glob</b>	g/dL	0.10	0.08	0.04-0.22	0.05
<b><math>\alpha</math>2-glob</b>	g/dL	1.08	1.10	0.27-1.86	0.47
<b><math>\beta</math>-glob</b>	g/dL	1.44	1.46	1.16-1.74	0.16
<b><math>\gamma</math>-glob</b>	g/dL	0.23	0.20	0.14-0.32	0.06

#### **Acute Phase Proteins:**

Acute phase proteins increase or decrease as part of the acute response of the innate immune system in the body. They are complexed with other blood molecules and increase and decrease with injury or disease processes. Little work has been performed in elasmobranchs to study their acute phase response, though what few studies exist have found that certain acute phase proteins may be clinically relevant biomarkers of inflammation, disease and environmental stress (Karsten, 2004; Hyatt et al., 2016). Developing reference ranges for future studies will help determine if these are useful tools to detect or define clinical or subclinical disease. With the additional 7 subadult and adult animals from Nova Scotia, a preliminary reference range for subadult and adult white sharks was created (Table 6).

**TABLE 6:**

		<b>Preliminary Acute Phase Protein Ranges for Subadult and Adult White Sharks (N=13)</b>			
<b>Analyte</b>	<b>Unit</b>	<b>Mean</b>	<b>Median</b>	<b>Min-Max</b>	<b>SD</b>
<b>C reactive protein</b>	mg/L	15.6	5.7	0.91-68.5	26.1
<b>Serum amyloid A</b>	mg/L	2.84	2.84	0.36-5.32	3.5
<b>Haptoglobin</b>	mg/ml	0.65	0.67	0.19	1.26

Median C-reactive protein (CRP) levels in adults were negligible or below the limit of detection in all but 2 animals sampled in South Carolina in 2017. In those animals CRP was 6-fold above the reference range created. This is similar to the type of seasonal and locational variation noted in previous elasmobranch studies (Krol, 2014; Karsten, 2004). SAA is a marker of acute inflammation and significant increases can occur within 24 hours of insult. Serum amyloid A levels in normal animals are usually negligible.

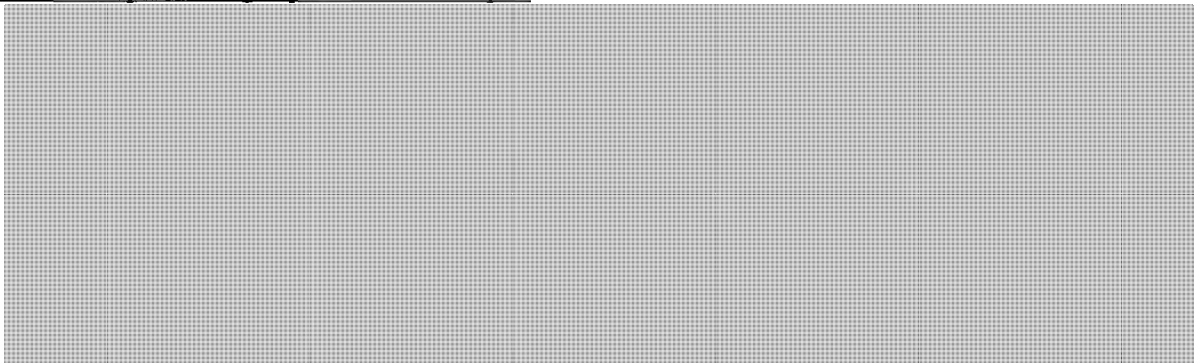
Normal reference intervals for most species are less than 10-20 mg/ml. It's not uncommon to see a 100 fold or more increase in acute inflammatory processes of horses. In most other species serum amyloid A (SAA) is a moderate acute phase protein that only shows a 2-5 fold increase in the face of inflammatory processes. Normal or minimally elevated levels can be seen with long-term diseases and in those cases haptoglobin (HG) may be a more useful biomarker. Give the short half-life SAA is a good prognostic marker with repeated testing. Our preliminary findings suggest that serum amyloid A may not be a useful biomarker in elasmobranchs and may not be present or detectable. Haptoglobin (HG) is a known marker of chronic inflammation and, in contrast to other major acute phase proteins increases occur 4 to 6 days after injury/insult. Levels are often only increased 2 -5 fold during inflammatory processes. Normal reference intervals are <1 or <2 mg/ml. Haptoglobin levels in all white sharks were within ranges reported to be normal in other species.

Future analyses planned:

- Additional animals from each age class (subadult and adult) are required to create robust statistically significant reference intervals.
- Relationships between age, gender, location of capture and handling variables need to be statistically assessed.
- Relationships between clinical findings during examination and reference intervals need to be assessed.
- Cytochemical staining of white blood cells and electron microscopy needs to be completed.

Publications anticipated using expedition data/samples:

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References:

- Arnold, JE. (2005) Hematology of the sandbar shark, *Carcharhinus plumbeus*: standardization of complete blood count techniques for elasmobranchs. Vet Clin Path 34(2):115-123
- Emery, SH. (1986) Hematological comparisons of endothermic vs ectothermic elasmobranch fishes. Copeia 1986(3): 700-705.
- Frick, LH, Reina, RD, Walker, TI. (2009) The physiological response of Port Jackson sharks and Australian swellsharks to sedation, gill-net capture, and repeated sampling in captivity. N Amer J Fish Manag 29(1): 127-139.
- Haman, KH, Norton, TM, Thomas, AC, Dove, AD, Tseng, F. (2012) Baseline health parameters and species comparisons among free-ranging Atlantic sharpnose (*Rhizoprionodon terraenovae*), bonnethead (*Sphyrna tiburo*) and spiny dogfish (*Squalus acanthias*) sharks in Georgia, Florida and Washington, USA. J Wildl Dis 48(2): 295-306.
- Harms, C, Ross, T, Segars, A. (2002) Plasma biochemistry reference values of wild bonnethead sharks, *Sphyrna tiburo*. Vet Clin Path 31(3): 111-115.



- Hyatt, MW, Field, C., Clauss, TM, Arheart, KL, Cray, C (2016) Plasma protein electrophoresis and select acute phase proteins in healthy bonnethead sharks (*sphyrna tiburo*) under managed care. J Zoo Wildl Med 47(4): 984-992.
- Karsten, AH, Rice, CD. (2004) c-Reactive protein levels as a biomarker of inflammation and stress in the Atlantic sharpnose shark (*Rhizoprionodon terraenovae*) from three southeastern USA estuaries. Mar Env Res 58: 747-751.
- Krol, L, Allender, M, Cray, C, George, R. (2014) Plasma proteins and selected acute-phase proteins in the whitespotted bamboo shark (*Chiloscyllium plagiosum*). J Zoo Wildl Med 45(4): 782-786.

### **VIII. Physiological effects of capture stress in the white shark**

#### **Collaborator Names:**

Michael W. Hyatt, DVM  
Bryan Franks, PhD  
Robert Hueter, PhD

#### **Institutions:**

Wildlife Conservation Society/New York Aquarium  
Jacksonville University  
Mote Marine Laboratory

#### **Brief description of specific project (from Science Brief):**

Forecasting the survival of elasmobranchs released after recreational capture or bycatch is important to creating informed conservation strategies for shark populations at risk, and for designing best practices to minimize stress during capture and release. At this time there is limited ability to study the primary stress response in sharks (increased circulating catecholamines and corticosteroids), but secondary changes in blood chemistry and blood gas profiles incited by the primary stress response (acidemia from metabolic and respiratory acidosis, hypoglycemia, electrolyte and metabolite alterations) can be detected through plasma biochemistry and real-time blood gas analysis using point of care devices. Profiles of the secondary stress response in sharks have been developed, but there is significant species variability in this secondary response, which may be linked to metabolic and thermal strategy (endothermic vs. ectothermic species) as well as the type and duration of stressor. (Wells, 1986; Skomal, 2012) Further uncertainties exist as to whether these measures alone can be used to predict survival after release. Therefore tagging, in addition to blood chemistry measures, is required to develop accurate survivorship forecasting for a given species.

Little is known regarding the secondary stress response to capture of the various life stages of white sharks or their survival rate after release. Given the importance of white shark post-release survivorship to population growth, and their unique metabolic and thermal physiology compared to most elasmobranch species (endothermic), detailed assessment of the physical and physiological effects of capture and their subsequent impacts on survivorship is warranted. The objectives of the current study are to: (1) quantify relative acid-base, electrolyte, and metabolite disturbances in the blood of white sharks exposed to capture, air exposure, and handling; and (2) examine immediate and delayed post-release mortality as revealed by satellite tracking.

#### **Data collected / Samples obtained from Nova Scotia 2018 expedition:**

During the procedure total handling time, total fight time, total procedure time, time between blood samples and recovery time were collected for future comparison with regard to blood gas, electrolyte and metabolite values and survivability. Six of the 7 animals had fin-mounted SPOT tags placed during the procedure and 2 animals had towable PSAT's placed to permit study of post release movements and survival. One animal was not SPOT-tagged due to size limitations placed in the initial SARA permit prior to revision.

In all 7 animals paired whole blood samples were collected during handling, one at the start of the procedure and one just prior to release. The first sample is consistent with previous studies of secondary stress response in elasmobranch species which typically utilize a single time point. The second sample is collected to assess the secondary stress response while the animal is handled on the lift. From each of the 14 samples an iSTAT CG4 cartridge was run within 1 minute of completion of handling to assess blood pH, blood bicarbonate levels ( $\text{HCO}_3$ ), blood gases including the partial pressure of oxygen ( $\text{pO}_2$ ), partial pressure of carbon dioxide ( $\text{pCO}_2$ ), total carbon dioxide ( $\text{TCO}_2$ ) and oxygen saturation ( $\text{sO}_2$ ), lactate levels and a calculated base excess (BE). These samples were interpreted immediately for each animal as part of veterinary monitoring of these animals during scientific sampling and were recorded for further comparison. Whole blood samples were spun down within 5 minutes and plasma was archived and later submitted for a complete chemistry analysis. Blood urea nitrogen (BUN), calcium (Ca), chloride (Cl), creatinine phosphokinase (CPK), glucose (Glu), potassium (K), magnesium (Mg), sodium (Na) have all been previously assessed as significant factors in capture stress survivorship and were recorded at both blood collection time points.

#### Results obtained as of 1 Dec 2018:

To date, all 6 animals with SPOT tags have provided GPS tracking data and locations consistent with continued movement and survivorship after handling. The total handling, fight, procedure, recovery and blood sample timings were compared between previously assessed subadult and adult white sharks and the Nova Scotia white sharks (Table 1). Mean and median procedure and recovery times with the animals in Nova Scotia were similar with previous animals. There is a difference in mean and median total handling time, which may reflect the difference in method of capture. Although both handline and drumline methodologies have been used in all expeditions, animals in previous expeditions were predominantly caught on handlines, while the animals on the Nova Scotia expedition were predominantly caught on drumlines. Fight times were similar for both methodologies.

**TABLE 1:**

	Previous White Sharks (N=5)				Nova Scotia White Sharks (N=7)			
Time	Mean	Median	Min-Max	SD	Mean	Median	Min-Max	SD
Total handling time	38.6	41	29-44	6.2	62.7	61	39-95	23.46
Fight time	19.8	22	9-24	6.1	39.43	29	20-66	18.77
Procedure time	18.2	19	15-20	1.9	21.86	21	13-33	7.99
Recovery time	0.8	1	0-2	0.8	6.4	2	0-17	6.8
Time to first blood sample	24.2	26	17-27	4.2	45.9	44	23-68	17.9
Time to second blood sample	36	37	28-42	6.0	55.3	56	35-79	17.5
Time between blood samples	11.8	11	8-15	2.8	11.1	11	6-17	3.3

The iSTAT results from the first blood sample were compared between the Nova Scotia white sharks and previous white sharks (Table 2). These values are similar to each other and similar to the findings in post release capture studies in other endothermic and ectothermic elasmobranch species with good survivorship (French, 2015; Heberer, 2010; Hyatt, 2012).

**TABLE 2:**

Analyte	Unit	Previous White Sharks (N=5)				Nova Scotia White Sharks (N=7)			
		Mean	Median	Min-Max	SD	Mean	Median	Min-Max	SD
pH (TC)	SU	7.07	7.06	6.89-7.21	0.13	7.05	7.03	6.85-7.26	0.14
pCO <sub>2</sub> (TC)	mmHg	23.6	24.78	16.74-28.66	4.68	16.92	16.09	11.14-24.86	4.98
pO <sub>2</sub> (TC)	mmHg	64.66	66.11	22.85-101.7	29.20	21.44	22.93	11.1-28.82	7.33
HCO <sub>3</sub>	mmol/L	7.88	7.5	5.4	10.8	5.37	5.3	3.4-7.6	1.71
Lactate	mmol/L	7.16	5.2	4.5-11.8	3.33	9.67	9.55	7.14-12.56	2.27

The 7 animals from the Nova Scotia expedition were added to an additional 5 animals evaluated on previous expeditions and were used to create baseline descriptive statistics and a preliminary reference intervals for secondary stress response (select blood gas analytes, electrolytes and muscle enzymes) in subadult and adult white sharks. Additionally the secondary stress responses evident in the iSTAT analysis at the beginning and end of handling on the lift were compared (Table 3).

**TABLE 3:**

Analyte	Unit	Sample 1 (N=12)				Sample 2 (N=12)			
		Mean	Median	Min-Max	SD	Mean	Median	Min-Max	SD
pH (TC)	SU	7.06	7.04	6.85 – 7.26	0.13	7.06	7.09	6.92-7.22	0.10
HCO <sub>3</sub>	mmol/L	6.51	6.50	3.4-10.8	2.26	5.72	6.4	2.6-7.7	1.69
pCO <sub>2</sub> (TC)	mmHg	19.96	20.16	11.14-28.66	5.78	17.15	16.99	10.49-27.56	4.77
pO <sub>2</sub> (TC)	mmHg	41.08	28.22	11.1 – 101.7	29.62	82.7	36.32	5.26-237.24	84.32
Lactate	mmol/L	8.53	9.49	4.5-12.56	2.96	8.71	8.79	4.9-13.09	2.43
BUN	mg/dL	1051.6	1052	408-1283	154.8	1021.8	1024	413-2976	233.8
Ca	mg/dL	15.5	15.3	14-19.5	1.2	15.5	15.7	12.1-18.1	1.1
Cl	mmol/L	274.3	276	210-316	24.9	285.9	282	234-349	35.0
CPK	U/L	126.8	51	21-647	175.2	90.5	55	21-619	126.4
Glu	mg/dL	111.0	112.5	76-158	18.9	115.2	114	64-161	21.5
K	mmol/L	4.5	4.5	2.7-5.5	0.6	4.56	4.4	3.2-7.3	0.9
Mg	mg/dL	3.2	3.2	2.6-4.2	0.4	3.6	3.5	2.5-8.7	1.1
Na	Mmol/L	281.5	282	221-349	30.3	285	272.5	216-367	45.1

A sample size of 60 animals is generally considered the gold standard for creating reference ranges and an n of 20 animals is necessary for creating of appropriate 95% confidence intervals. Our n remains below statistical requirements but based on preliminary analysis the following trends are apparent:

1. Adult and subadult white sharks exhibit a similar secondary stress response to capture as other elasmobranch species, including other endothermic elasmobranchs. These responses include acidemia (decreased blood pH) and elevated lactate. There was no evidence of significant osmoregulatory changes (Na, Cl, K, BUN) with capture or with handling. Significant hypoglycemia, as previously reported, was not noted.
2. During handling on the lift blood pH remains stable and bicarbonate ( $\text{HCO}_3$ ) levels demonstrate a mild decrease consistent with successful appropriate metabolic compensation of these animals during handling.
3. Blood gases ( $\text{pCO}_2$ ,  $\text{pO}_2$ ) demonstrate improvement while on the lift, specifically a decrease in partial pressure of  $\text{CO}_2$  and an increase in partial pressure of  $\text{O}_2$ . This is consistent with adequate ventilation during handling.
4. Lactate levels are elevated and mean and median levels are within published ranges for capture stress with good survivorship in both ectothermic and endothermic elasmobranch species. The medians between sample 1 and 2 support the observation that lactate may decrease in white sharks during handling on the lift. This observation was noted in 50% of the subadult and adult animals examined to date. This is an unexpected finding that requires further study. The expected physiologic responses of elasmobranchs to capture stress is a lactate level that increases over the first hours of a capture event. Recently it has been proposed that endothermic elasmobranchs are able to more quickly physiologically shift from anaerobic metabolism to aerobic metabolism (French, 2015). The lactate decrease in handled white sharks may reflect this physiologic resistance in the face the adequate ventilation provided on the lift.

#### Future analyses planned:

- Additional animals from each age class (subadult and adult) are required to create robust statistically significant reference ranges for the blood gas and blood biochemical profiles.
- Relationships between handling time, fight time, procedure time, recovery time, animal size, and blood biochemical and blood gas alterations need to be statistically assessed.
- Relationships between biochemical and blood gas alterations and post release survivorship need to be assessed.
- Primary stress response including  $1\alpha$ hydroxycorticosterone, epinephrine and norepinephrine levels will be assessed in the future (expected March 2019) from archived expedition samples.

#### Publications anticipated using expedition data/samples:

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#### References:

- French RP, Lyle J, Tracey S, Currie S, Semmens JM (2015) High survivorship after catch-and-release fishing suggests physiological resilience in the endothermic shortfin mako shark (*Isurus oxyrinchus*). *Conserv Physiol* 3(1): cov044; doi:10.1093/conphys/cov044.
- Heberer, C, Aalbers, SA, Bernal, D, Kohin, S, DiFiore, B, Sepulveda, CA (2010) Insights into catch-and-release survivorship and stress-induced blood biochemistry of common thresher sharks (*Aliopas vulpinus*) captured in the southern California recreational fishery. *Fish Research* 106: 495-500.

- Hyatt, MW, Anderson, PA, O'Donnell, PM, Berzins, IK (2012) Assessment of acid-base derangements among bonnethead (*Sphyrna tiburo*), bull (*Carcharhinus leucas*), and lemon (*Negaprion brevirostris*) sharks from gillnet and longline capture and handling methods. *Compar Biochem Phys A* 162: 113-120.
- Skomal, GB, Mandelman, JW (2012) The physiological response to anthropogenic stressors in marine elasmobranch fishes: A review with a focus on the secondary response. *Compar Biochem Phys A* 162: 146-155.
- Wells, R.M.G., McIntyre, R.H., Morgan, A.K., Davie, P.S. (1986) Physiological stress responses in big gamefish after capture: observations on plasma chemistry and blood factors. *Comp. Biochem. Physiol. A*. 84, 565–571.

## **IX. Reproduction in white sharks**

Collaborator Names: Jim Gelsleichter

Institutions: University of North Florida

### **Brief description of specific project (from Science Brief):**

Little is known of the reproductive biology of the white shark in the western North Atlantic. We are taking advantage of direct access to live animals in the wild to obtain blood for the analysis of reproductive hormones (estradiol and progesterone for females, testosterone for males) using commercially available chemiluminescence immunoassays. In addition, ultrasound technology is being used to assess the reproductive status of females. In males, clasper characteristics will be qualified and quantified. Our objectives are to assess reproductive condition, reproductive cycle, gestation period, and fecundity. Of particular interest is to survey locations in the western North Atlantic that are serving as sites for white shark mating and pupping.

To date, we have examined plasma testosterone concentrations in 11 male white sharks and plasma estradiol concentrations in 13 female white sharks, including the 7 from Nova Scotia. Hormone levels increase with size and appear to support current estimates for size at maturity. Sample sizes of suspected mature individuals is low and do not currently provide informative data on reproductive seasonality; however, this is likely to change as samples from added time periods become available for measurement. We have also measured metabolite profiles in all individuals and data may have value in determining the stage of maturity in this species.

Plasma samples from the 7 white sharks (5 males, 2 females) collected as part of the Canada Expedition were transferred to UNF in late October 2018. Samples are currently being stored frozen until used to measure plasma hormone concentrations, which is expected to take place prior to the end of December 2018.

### **Data collected / Samples obtained from Nova Scotia 2018 expedition:**

- Plasma samples from 7 white sharks (5 M, 2 F)
- Ultrasound examinations were not performed on the two females as the machine was not onboard during that phase of the expedition.

### **Results obtained as of 1 Dec 2018:**

- N/A

### **Future analyses planned:**

- Plasma testosterone and estradiol concentrations will be determined in the 7 samples during December 2018.

## **X. Semen analysis of white sharks**

Collaborator Names: Michael.Hyatt, [REDACTED]

Institutions: Wildlife Conservation Society/New York Aquarium, South East Zoo Alliance for Reproduction & Conservation

Little is known on standardized semen collection and analysis in white sharks. Sperm motility, viability, and morphology not only can add to the health assessment, but also to predict sperm maturation and time to breeding. Understanding the reproductive seasonality of mature male sharks when compared along with satellite tracking may help identify breeding grounds.

Expedition Nova Scotia aboard the M/V OCEARCH allowed for the examination and attempted semen collection for three male white sharks *Carcharodon carcharias*. No semen was collected from 2 of the 3 males. One shark (Nova) was at the minimum limit of maturity based on total length and may not have been sexually mature. The second shark (Jefferson) was reproductively mature and either no semen was available for collection or the collection method failed. Semen collection was successful for shark NS2018-03, Hal. Semen collection in NS2018-03 yielded a 15ml pale tan ejaculate with a sperm concentration of 31.75 million sperm per ml and a pH of 6.5. Microscopically, the raw semen sample was composed of 40% clumps and spermatophores among a background of individual sperm with 0% motility. After dilution 1:100 in sea water, total motility was 30% with no evidence of progressive motility. A portion of the ejaculate was centrifuged to separate the seminal fluid, which was banked and has been submitted for hormonal analyses. Semen was preserved in Trump's fixative and 10% neutral buffered formalin and has been submitted for confocal microscopy and morphological analysis. Compared to a previous white shark semen sample collected in March 2017 off of Hilton Head, SC, this sample was a much smaller volume and had lower total motility. At this time, we are uncertain whether these differences are related to seasonal, geographic, water temperature, or individual differences. Continued sampling through the year and geographic range is necessary to characterize seasonal semen quality and quantity.



## **XI. Characterization of sperm DNA fragmentation in the white shark**

Collaborator Names: [REDACTED]

Institutions: SeaWorld and Busch Gardens Species Preservation Laboratory

Brief description of specific project (from Science Brief):

Sperm DNA fragmentation in sharks is currently being validated in various species at SeaWorld Parks. Baseline data will be collected from white sharks and the data can be used as reference points for oceanic health evaluations and comparison with other sharks in the wild.

Data collected / Samples obtained from Nova Scotia 2018 expedition:

- Aliquot of frozen semen for sperm DNA fragmentation assay from NS2018-03.
- Aliquot of fresh semen in fixative for morphology assessment from NS2018-03.

Results obtained as of 1 Dec 2018:

- Samples have not yet been analyzed.

Future analyses planned:

- Sperm DNA fragmentation assay will be performed in February 2019.
- Sperm Morphology will be assessed in January 2019.

## **XII. Body burdens and molecular responses to methyl mercury and persistent organic pollutants in Atlantic sharks**

**Collaborator Names:** [REDACTED] Maeva Giraudo

**Institutions:** Stony Brook University, Cape Canaveral Scientific, Environment & Climate Change Canada

### **Brief description of specific project (from Science Brief):**

The objective of this research is to provide an integrated analysis of the accumulation of contaminants and cellular impacts of mercury and persistent organic pollutants (POPs) on Atlantic sharks. Previous studies have quantified the body burdens of mercury and POPs in sharks and their relatives; however, very few studies have investigated the potential impacts of these contaminants on sharks. Muscle tissue samples from Atlantic sharks will be analyzed for mercury and POP content. Additionally, we will evaluate differential RNA expression of a suite of transcripts known to be associated with mercury and POP exposure and effects using quantitative polymerase chain reaction (qPCR) to determine if important biological pathways may have been modified by contaminant exposure.

### **Data collected / Samples obtained from Nova Scotia 2018 expedition:**

- 1-2 grams dorsal muscle obtained from each of the 7 animals—collected for mercury & POP quantification
- 100 mg dorsal muscle obtained in triplicate from each of the 7 animals, stored in RNAlater salt preservative solution—collected for gene expression analysis

### **Results obtained as of 1 Dec 2018:**

- N/A

### **Future analyses planned:**

- Total mercury quantification in muscle tissue using DMA-80 mercury analyzer.
- POP (PCBs & legacy organochlorines) quantification in muscle tissue using gas chromatography mass spectrometry.
- Expression analysis of gene transcripts (e.g. CYP1A, MT) using qPCR.
- Expression analysis of protein biomarkers (e.g. oxidative stress).

### **Publications anticipated using expedition data/samples:**

Under development, anticipated within two years

### **XIII. Comparative analysis of DNA sequence variation in the white shark**

Collaborator Names: Gavin Naylor, [REDACTED]

Institutions: University of Florida

#### **Brief description of specific project (from Science Brief):**

There are now a number of documented cases where pelagic fish species, like white sharks, that routinely migrate thousands of kilometers across the world's oceans show striking genetic sub-structure among populations. Such restricted gene flow in the face of extensive individual movement is generally taken to be an indicator of fidelity to a breeding site. Animals may range far and wide but return to the same site/region to breed. It follows from this that contrasting population genetic data with information from tracking studies can yield insights into breeding behavior and the incidence of philopatry. Our objective is to determine the global population structure among white sharks to provide a baseline against which tracking data can be interpreted. We will contrast population structure in white sharks deduced from comparative analysis of DNA sequence data with tracking information from the OCEARCH satellite tagging program.

#### **Data collected / Samples obtained from Nova Scotia 2018 expedition:**

- Whole blood samples on ethanol from 5 male and 2 female white sharks

#### **Results obtained as of 1 Dec 2018:**

- Sequence data to be obtained from the samples within one year.

#### **Future analyses planned:**

- High quality reference genome assembly.

#### **Publications anticipated using expedition data/samples:**

- Sample data must be collected before we can anticipate the publications that will result. Many collaborators are involved from all over the world.

#### XIV. Ectoparasites of white sharks and other shark species

Collaborator Names: [REDACTED]

Institutions: Auburn University

##### Brief description of specific project (from Science Brief):

The study of parasites can further understanding of the natural history and biological attributes of epipelagic sharks; especially regarding stock structure, movements, and behavior. Sharks are infected by a spectrum of ecto- and endo-parasitic species assigned to numerous phyla and each having a distinct life history and ecological relationship with their host. Further, even for epipelagic fishes with cosmopolitan distributions, not all of the parasites infecting these fishes are similarly geographically distributed. The white shark is infected by a diverse community of ectoparasitic copepods (Copepoda: Siphonostomatoida). These parasites eat shark epithelial cells and blood, some can move from shark to shark, and, therefore, can provide unique insights into white shark biology and behavior. Although numerous reports of parasitic copepods infecting white sharks exist, the taxonomic identities of some copepods remain ambiguous and need further study stemming from new collections. Combining genetic and taxonomic approaches, a goal of this work is to use parasitological and epidemiological information (principally from ectoparasitic copepods) to explore white shark movements and associations with other elasmobranchs throughout their range. A related goal of this work is to systematically characterize the ectoparasite community infecting white sharks and test if white sharks from a geographic area have a unique, mixed, or common ectoparasite fauna. Further, although assumed that white sharks are not affected by infectious disease, practically no baseline infectious-disease information from wild-caught white sharks exists. A focus on the parasites of white sharks hastens an emphasis on white shark health in the broad sense.

##### Data collected / Samples obtained from Nova Scotia 2018 expedition:

Copepods from gill and skin (fins and near claspers) of 7 white sharks (*Carcharodon carcharias*).

##### Results obtained as of 1 Dec 2018:

The Nova Scotia white shark samples have been compared with the following previously collected samples by OCEARCH:

- Parasitic copepods from skin of 1 silky shark (*Carcharhinus falciformis*)
- Copepods from skin (near claspers) of 1 bigeye thresher shark (*Alopias superciliosus*)
- Copepods from gill and skin (fins) of 3 tiger sharks (*Galeocerdo cuvier*)

At least 2 species (male and female copepods) of *Pandarus* (Siphonostomatoida: Pandaridae), 2 of *Echthrogaleus* (Pandaridae), and 1 of *Nessipus* (Pandaridae) have been delineated from white sharks.

At least 1 species of *Pandarus* has been delineated from three shark species (silky shark, tiger shark, and white shark). One species of *Pagina* (Pandaridae) was identified from the bigeye thresher shark but not from other species of shark. Representatives of each putative species have been isolated, cleaned of host tissue, cleared in lactic acid, and stained in lignin pink for identification to species. Vouchers of each species have been stabilized in molecular grade ethanol for subsequent DNA extraction and sequencing.



##### Future analyses planned:

- Morphological circumscription of parasitic copepods (microdissection and bioillustration of appendages)



- Genetic characterization (DNA extraction and sequencing of 18S, ITS1/2, 28S rDNA)
- Genetic barcoding of gut contents (blood, epithelial cells) of parasitic copepods from white sharks
- Statistical analysis of site specificity of ectoparasites from white sharks

Publications anticipated using expedition data/samples:

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## **XV. Visual physiology of white sharks**

Collaborator Name: Christine Bedore

Institution: Georgia Southern University

### Brief description of specific project (from Science Brief):

The capabilities of sensory systems are correlated to the physical properties of the habitat in which they are used. To understand the sensitivity of white shark visual systems, we will (1) record shark eye size and total length and (2) model the sensitivity of the visual system, and (3) correlate eye size (sensitivity) to light habitat estimated from satellite tag data as sharks migrate between shallow and deep water, as well as across ocean basins. Understanding visual sensitivity of white shark eyes will help us to understand how these sharks forage and migrate in a wide range of spectral habitats.

### Data collected / Samples obtained from Nova Scotia 2018 expedition:

- Shark eye photographs (n=7)

### Results obtained as of 1 Dec 2018:

- Preliminary data suggest that white shark and shortfin mako eyes are not larger than tiger sharks, but are larger than blue sharks.
- Modeling of sensitivity (using visual range as a proxy) showed that target contrast with respect to the background increased visual range more than eye size. For example, juvenile and adult white sharks likely have the same sensitivity in habitats that are not light-limited (which includes the habitats where the sharks were captured), but a dark prey item can be seen from a greater distance than a light prey item for both age groups.
- There was no difference in sensitivity among species, but sample size is limited.
- Maximum visual range (the farthest away that a target can be detected) was similar to the depth range occupied by juvenile white sharks (Curtis et al., Scientific Reports publication), but more consideration of habitat depth and other features that may limit movement will improve interpretation of the data.

### Future analyses planned:

- Continue collecting photograph data. Large sample size needed across whole size range to draw useful conclusions. Currently have data from approximately 15 sharks, likely need closer to 50. Attempting to collect additional data from other sources (e.g. museum specimens).
- Continue modeling and manipulate other visual parameters that may affect sensitivity (e.g. depth, time of day/angle of the sun, turbidity).
- Consider acuity to determine how eye size affects vision across ontogeny and species. Although larger eyes may not improve sensitivity, they may improve acuity.
- Incorporate telemetry data and movement patterns to interpret visual needs and limitations based on ecology.

### Publications anticipated using expedition data/samples:

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## **XVI. Trophic ecology of white sharks in the western North Atlantic**

Collaborator Names: [REDACTED]

Institutions: Woods Hole Oceanographic Institution, University of Washington

### **Brief description of specific project (from Science Brief):**

Understanding the trophic ecology of white sharks is important because as apex predators, they are likely to have a disproportionate influence on food web structure in coastal oceans. Conventional bulk stable isotope analyses used to determine trophic position (TP) are challenging for highly migratory species, such as white sharks, that move through isotopically distinct food webs and shift diets seasonally and ontogenetically. Recent advances in compound-specific stable isotope analysis (e.g. individual amino acids) have significantly reduced the influence of potentially confounding variables (shifting TP and different isotopic baselines) when determining TP of highly migratory species. Compound-specific stable isotope analyses will be conducted on muscle tissue from sharks sampled on OCEARCH to examine temporal shifts in TP, changes in isotopic baseline values, and/or migration between isotopically distinct habitats.

### **Data collected / Samples obtained from Nova Scotia 2018 expedition:**

- Samples have been freeze-dried and are waiting for isotope analysis using GC-ICPMS.

### **Results obtained as of 1 Dec 2018:**

- N/A

### **Future analyses planned:**

- 1) temporal shifts in TP
- 2) changes in isotopic baseline values
- 3) migration between isotopically distinct habitats.

### **Publications anticipated using expedition data/samples:**

- [REDACTED]

**COMPARISON BETWEEN OCEARCH PLATFORM METHOD AND NON-CAPTURE HARPOONING METHOD  
FOR STUDIES OF LARGE SHARKS IN THE WILD**

<b>RESEARCH PROCEDURE</b>	<b>BENEFITS</b>	<b>CHALLENGES</b>	<b>OCEARCH PLATFORM METHOD</b>	<b>NON-CAPTURE HARPOONING METHOD</b>
Attachment of fin-mounted SPOT satellite tag	Best accuracy of geolocation satellite tracking data each time shark is at surface, for up to 5 years; works worldwide	Shark must be temporarily restrained; not all sharks spend time at surface	Standard procedure	Not possible
Attachment of PSAT satellite tag	Provides archival data on depth and temperature for up to ~1 year, works worldwide	Must wait until tag detaches to receive data; geolocation data accuracy can be poor, not suitable for fine-scale studies; tags can be shed	Standard procedure, with ability to ensure proper tag attachment	Standard procedure, but proper tag attachment cannot be ensured
Attachment of acoustic tag	Provides fine-scale geolocation data; long-term tags, up to 10 years	Only works when shark is in range of u/w acoustic receiver, which are in <1% of ocean space; data capture delayed until receivers are downloaded	Standard procedure by internal implantation in body cavity, yielding up to 10 years of data	Only possible by harpooning external tag; external tags can be shed and usually work for <1 year
Body morphometrics	Accurate measurements provide for best age/growth/maturity analyses	Shark must be temporarily restrained	Standard procedure by measuring tape on body; weight measurements planned by electrical scale on platform	Not possible, rough estimates only
Blood sampling	Provides for wide variety of physiological and health assessments, incl. reproductive endocrinology, ecotoxicology and contaminants of concern, nutritional markers, stress markers	Shark must be temporarily restrained and blood draw should be in air to prevent contamination	Standard procedure	Not possible
Mucus sampling	For microbiological and antibiotic studies, incl. applications to human health	Shark must be temporarily restrained and samples must be taken in air to prevent contamination	Standard procedure	Not possible



RESEARCH PROCEDURE	BENEFITS	CHALLENGES	OCEARCH PLATFORM METHOD	NON-CAPTURE HARPOONING METHOD
Muscle biopsy	For wide variety of physiological and health assessments, incl. stable isotopes for trophic studies, ecotoxicology and contaminant analyses	Deep sample of muscle tissue is necessary	Standard procedure, with ability to take sample from site of PSAT tag attachment thereby reducing sample wounds on shark	Not possible, except by harpooned biopsy sampler; failures to collect tissue are common
Ultrasound	Crucial for confirming pregnancy of mature females; also useful for examining other organs and stomach contents	Shark must be temporarily restrained with underside in air	Standard procedure	Not possible
Ectoparasite sampling	For parasitology and population range studies	Shark must be temporarily restrained so that removal of external parasites can be conducted	Standard procedure from multiple sites on shark	Not possible
Gastric lavage	Direct observation of food habits of shark	Shark must be temporarily restrained and stomach must be flushed	Not standard procedure, but possible	Not possible
Genetic sampling	Skin/fin samples provide DNA for variety of genetic studies, incl. population genetics	Must get access to shark skin to sample	Standard procedure, by fin clip	Not possible, except by harpooned biopsy sampler; failures to collect tissue are common
Sperm sampling	To confirm maturity, mobility and viability of male sperm	Shark must be temporarily restrained and access to claspers must be in air to prevent contamination	Standard procedure	Not possible
Eye photography and measurements	For studies of sensory ecology of sharks	Shark must be temporarily restrained for access to eyes	Standard procedure	Not possible
Fecal sampling	For genomic studies of food habits for trophic ecology	Shark must be temporarily restrained and samples must be taken in air to prevent contamination	Standard procedure	Not possible



## **OCEARCH PUBLIC OUTREACH FOR NOVA SCOTIA EXPEDITION 2018**

In addition to the wealth of scientific studies conducted during the 2018 expedition in Nova Scotia, OCEARCH provided substantial outreach for the public. In partnership with Green Schools of Nova Scotia, OCEARCH personnel visited nine schools in Halifax and Lunenburg and spoke to their students about OCEARCH's mission to inspire current and future generations of explorers, scientists, and stewards of the ocean. OCEARCH also hosted 11 presentations to the public in those communities, including talks at the Lunenburg Library and to the Bluenose Coastal Action Foundation. OCEARCH also welcomed the Nova Scotia communities to tour the ship, meet the team, and learn about our research goals and methods. Public ship tours were held at both Halifax and Lunenburg ports.

### **Outreach Metrics**

**26 Ship tours**  
**11 Presentations**  
**3,600 Total engagement**



OCEARCH's Chris Fischer engages a class of young Canadian students

### ***Press Summary***

During the expedition we invited the press from both Canada and the U.S. to join the team for a day trip to cover our first expedition in the region, document the research and outreach, and see the collaborative science team in action. Outlets that were not able to join us aboard were provided with phone and Skype interviews with the crew and the science team.

We hosted outlets such as Global News Canada, The Canadian Press, CBC News, 7NEWS, The Weather Network, and Canadian Surf Magazine aboard the vessel.

### **Press Metrics**

**769 Hits (555 Canadian outlets, 214 U.S. outlets)**  
**305M Possible impressions**  
**\$2.8M Ad value**



### ***Social Media Summary***

The Nova Scotia expedition presented OCEARCH with the opportunity to create highly engaging content for the public through social media. OCEARCH took advantage of the multiple sharks that were sampled and the stunning scenery of Nova Scotia to deliver fun and educational pieces for our audience to interact with in near-real time. This content from the ship allowed the audience to feel connected to the expedition. Content included video sequences and live interviews and was distributed through Facebook, Twitter, Instagram, Youtube, and the OCEARCH website. Engagement throughout the entire trip was exceptionally high, resulting in some of the greatest reach ever achieved from an OCEARCH expedition.

### **Social Media Metrics**

**8.1 M Total reach**

**243K Total engagement**

**700K Net followers reached**